

VOLUME TWO

Principles of Accounting

Chapters 14-27

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- Toys "R" Us Annual Report activities that make use of the latest Toys "R" Us financial statements
- Links to the web sites of companies and annual reports referenced in the book
- Business readings from leading periodicals
- Ready Notes, which are online versions of PowerPoint slides for taking notes in class
- The Accounting Transaction Tutor, with tutorials for every chapter to reinforce understanding of both accounting concepts and procedures

For Instructors

- PowerPoint slides for classroom presentation
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Web link to the Needles Accounting Resource Center Web Site.

*A full version of the software, including tutorials for all chapters of the text, is also available online.

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VOLUME TWO

Principles of Accounting Chapters 14-27

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Eighth Edition

HOUGHTON MIFFLIN COMPANY

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*To Jennifer, Jeffrey, Annabelle, and Abigail
To Bruce Crosson, and to J. Brent Crosson, Courtney Crosson, and
Helen and Bryce Van Valkenburgh*

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Chapter 14 Problems

- P 1. 2. Total Stockholders' Equity: \$1,488,000
- P 2. 1. 20x3 Total dividends: Preferred, \$420,000;
Common, \$380,000
- P 3. No check figure
- P 4. 2. Total Stockholders' Equity: \$1,446,900
- P 5. 2. Total Stockholders' Equity: \$330,375
- P 6. 2. Total Stockholders' Equity: \$351,400
- P 7. 1. 20x3 Total dividends: Preferred, \$120,000;
Common, \$68,000
- P 8. 2. Total Stockholders' Equity: \$475,040

Chapter 15 Problems

- P 1. 2. Difference in net income: \$97,600
- P 2. Income Before Extraordinary Items and
Cumulative Effect of Accounting
Change: \$410,000
- P 3. Income from Continuing Operations, December
31, 20x3: \$157,500
- P 4. 2. Total Stockholders' Equity, December 31,
20x5: \$2,964,000
- P 5. 2. Retained Earnings: \$250,000; Total
Stockholders' Equity: \$2,350,000
- P 6. 2. Total Stockholders' Equity: \$2,802,800
- P 7. Income Before Extraordinary Items and
Cumulative Effect of Accounting Change:
\$216,000
- P 8. 2. Total Stockholders' Equity, December 31,
20x3: \$518,500
- P 9. 2. Retained Earnings: \$397,000; Total
Stockholders' Equity: \$2,577,000

Chapter 16 Problems

- P 1. 1. Bond Interest Expense: Nov. 30, \$517,500
- P 2. 1. Bond Interest Expense: Sept. 1, \$377,200
- P 3. Bond Interest Expense: June 30, 20x2, \$289,332;
Sept. 1, 20x2, \$186,580
- P 4. 2. Loss on early retirement: \$2,261,504
- P 5. Loss on Retirement of Bonds: Feb. 28, 20x5,
\$1,600,000

- P 6. 1. Bond Interest Expense: Sept. 1, \$374,400
 P 7. 1. Bond Interest Expense: Nov. 30, \$1,040,300
 P 8. 1. Bond Interest Expense: June 30, 20x1, \$93,195; Sept. 30, 20x1, \$193,800

Chapter 17 Problems

- P 1. No check figure
 P 2. 1. Net Cash Flows from: Operating Activities, \$46,800; Investing Activities, (\$14,400); Financing Activities, \$102,000
 P 3. 1. Net Cash Flows from: Operating Activities, (\$106,000); Investing Activities, \$34,000; Financing Activities, \$44,000
 P 4. 2. Net Cash Flows from: Operating Activities, (\$106,000); Investing Activities, \$34,000; Financing Activities, \$44,000
 P 5. Net Cash Flows from Operating Activities: \$47,600
 P 6. 1. Net Cash Flows from: Operating Activities, \$63,300; Investing Activities, (\$12,900); Financing Activities, \$7,000
 P 7. No check figure
 P 8. 1. Net Cash Flows from: Operating Activities, \$548,000; Investing Activities: \$6,000; Financing Activities, (\$260,000)
 P 9. 2. Net Cash Flows from: Operating Activities, \$63,300; Investing Activities, (\$12,900); Financing Activities, \$7,000

Chapter 18 Problems

- P 1. No check figure
 P 2. Increase: a, b, e, f, l, m
 P 3. 1.c. Receivable turnover, 20x2: 14.1 times; 20x1: 14.4 times
 P 4. 1.b. Quick ratio, Lewis: 1.5 times; Ramsey: 1.2 times; 2.d. Return on equity, Lewis: 8.8%; Ramsey, 4.9%
 P 5. Increase: d, h, i
 P 6. 1.a. Current ratio, 20x2: 1.5 times; 20x1: 1.5 times; 2.c. Return on assets, 20x2: 5.0%; 20x1: 10.7%

Chapter 19 Problems

- P 1. No check figure
 P 2. Using the attachment, machine BD sorts 42,871 more checks than average in Week 8
 P 3. No check figure
 P 4. 2.a. Gross Margin: \$191,800; 2.d. Cost of Goods Manufactured: \$312,100
 P 5. 1.a. \$4; 1.e. \$10; 1.n. \$10
 P 6. Molding, Week 1, First Shift, hours per board: 3.50
 P 7. No check figure
 P 8. 2.a. Gross Margin: \$181,200; 2.d. Cost of Goods Manufactured: \$253,500

Chapter 20 Problems

- P 1. 2. Total unit cost: \$13.72
 P 2. Cost of goods manufactured: \$10,163,200
 P 3. a. \$2; f. \$4
 P 4. 1. Predetermined overhead rate for 20x3: \$5.014 per machine hour
 P 5. 2. Total costs assigned to Altun order, activity-based costing method: \$41,805.60
 P 6. 2. Overhead applied to Job 2214: \$29,717
 P 7. 2. Total costs assigned to Winkowsky order, activity-based costing method: \$69,280.40
 P 8. 1.c. Rigger II: \$11,665; BioScout: \$14,940

Chapter 21 Problems

- P 1. Cost of units sold: \$218,160
 P 2. 1. Job A product unit cost: \$5.00
 P 3. 2. Cost of units completed and transferred: \$76,470
 P 4. 1.c. Cost of ending work in process inventory: \$37,200
 P 5. 1.b. Total cost per equivalent unit: \$3.78
 P 6. 2. Under-applied overhead: \$260
 P 7. 2. Cost of units completed and transferred: \$185,073
 P 8. 1.b. Total cost per equivalent unit: \$.59

Chapter 22 Problems

- P 1. No check figure
 P 2. 1. Product unit cost: \$270.00; 4. Product unit cost: \$279.53
 P 3. 1.a. Total materials handling cost rate: 30% per dollar of materials
 P 4. 3. Total direct cost, Toy Bridge work cell: \$17,000
 P 5. 3. Cost of goods sold: \$564,400
 P 6. 1. Product unit cost: \$878.25
 P 7. 3. Product unit cost: \$10.433
 P 8. 3. Cost of goods sold: \$391,520

Chapter 23 Problems

- P 1. 4. Cost per Job: \$81.65
 P 2. 1. 740 Systems
 P 3. 1.a. 7,900 Units
 P 4. 2. 190,000 Units
 P 5. 2. 418 Loans
 P 6. 1. 7,500 Billable Hours
 P 7. 1.a. 3,500 Units
 P 8. 3. \$806.60 per Job

Chapter 24 Problems

- P 1. 1. Total Manufacturing Costs Budgeted, November: \$1,157,000
 P 2. 8. Income from Operations: \$3,086
 P 3. 1. Ending Cash Balance, February: (\$2,900)
 P 4. 1. Net Income: \$52,404

- P 5. Ending Cash Balance, February: \$19,555
- P 6. 1. Net Income: \$1,860,830
- P 7. 1. Ending Cash Balance, August: \$1,800
- P 8. 1. Projected Net Income: \$101,812

Chapter 25 Problems

- P 1. Total standard unit cost of front entrance, Year 20x1: \$8,510
- P 2. 1. Direct materials price variance—Liquid Plastic: \$386 (F); 2. Direct labor rate variance—Trimming/Packing: \$56 (U)
- P 3. 2. Flexible budget formula: Total Budgeted Costs = $(\$.35 \times \text{units produced}) + \$10,500$
- P 4. 1.b. Direct materials quantity variance: \$3,720 (U); 1.f. Manufacturing overhead volume variance: \$320 (F)
- P 5. c. \$11.50
- P 6. 1. Total standard direct materials cost per unit: \$167.52
- P 7. 1. Direct materials price variance—Metal: \$832 (F)
2. Direct labor rate variance—Molding: \$510 (F)
- P 8. 1.a. Direct materials price variance—Chemicals: \$12,200 (F); 1.e. Controllable manufacturing overhead variance: \$3,100 (U)

Chapter 26 Problems

- P 1. Flexible Budget, Total Cost: \$7,248,000
- P 2. 2. Center Income: \$194,782
- P 3. 1. Flexible Budget, Contribution Margin: \$88,200
- P 4. 3. Economic value added for 20x4: \$21,850
- P 5. 1. Residual income: (\$2,500)
- P 6. 2. Center Income: \$418,555
- P 7. 3.a. Actual Return on Investment: 6.3%
- P 8. 3. Economic value added: \$126,000

Chapter 27 Problems

- P 1. 1. Total cost to buy: \$1,350,000
- P 2. Contribution margin: \$7,725
- P 3. 3. Operating income from further processing, bagel sandwiches: \$.50
- P 4. 2. Net present value: (\$5,430)
- P 5. 1. Average annual net income, Cal Machine: \$34,965; Average annual net income, Hawk Machine: \$40,670
- P 6. 1. Total cost to make: \$3,084,000
- P 7. 1. Net present value: \$16,573
- P 8. 1. Exalt Machine: (\$32,379); 2. Exalt Machine: 20.7%; 3. Exalt Machine: 5.4 years

Principles of Accounting

14

Contributed Capital

LEARNING OBJECTIVES

- 1** Identify and explain the management issues related to contributed capital.
- 2** Define *start-up and organization costs* and state their effects on financial reporting.
- 3** Identify the components of stockholders' equity.
- 4** Account for cash dividends.
- 5** Identify the characteristics of preferred stock, including the effect on distribution of dividends.
- 6** Account for the issuance of stock for cash and other assets.
- 7** Account for treasury stock.
- 8** Account for the exercise of stock options.



DECISION POINT: A USER'S FOCUS



General Motors Corporation One way corporations raise new capital is by issuing stock. General Motors Corporation, a major automotive manufacturer, has issued common stock, including over \$2.9 billion in a recent three-year period, as shown in the Financial Highlights from the statement of cash flows.¹ Why does General Motors' management choose to issue common stock to satisfy some of its needs for new capital? What are some disadvantages of this approach?

There are advantages to financing with common stock. First, financing with common stock is less risky than financing with bonds, because dividends on common stock are not paid unless the board of directors decides to pay them. In contrast, if the interest on bonds is not paid, a company can be forced into bankruptcy. Second, when a company does not pay a cash dividend, the cash generated by profitable operations can be invested in the company's operations. Third, and most important for General Motors, a company may need the proceeds of a common stock issue to improve the balance between liabilities and stockholders' equity. The company lost more than \$23.5 billion in 1992, drastically reducing its stockholders' equity. However, by issuing common stock over the next several years, General Motors improved its debt to equity ratio and its credit rating.

On the other hand, issuing common stock has certain disadvantages. Unlike the interest on bonds, dividends paid on stock are not tax deductible. Furthermore, when it issues more stock, the corporation dilutes its ownership. This means that the current stockholders must yield some control to the new stockholders. It is important for accountants to understand the nature and characteristics of corporations as well as the process of accounting for a stock issue and other types of stock transactions.

Financial Highlights

(In millions of dollars)

	1999	1998	1997
Proceeds from issuing common stock	\$2,005	\$343	\$614

Management Issues Related to Contributed Capital

OBJECTIVE

1 Identify and explain the management issues related to contributed capital

A **corporation** is defined as “a body of persons granted a charter recognizing them as a separate legal entity having its own rights, privileges, and liabilities distinct from those of its members.”² In other words, a corporation is a legal entity separate and distinct from its owners.

VIDEO CASE

Lotus Development Corporation

Objectives

- To become familiar with the advantages of a corporation, especially in equity financing.
- To identify the ways investors obtain return on investment in a corporation.
- To show how stock buybacks affect return on equity as a measure of profitability.


Background for the Case




The story of software giant Lotus Development Corporation is a prototype of the recent history of high-technology companies.




When Lotus was founded in the early 1980s, its landmark spreadsheet program Lotus 1-2-3 was an overnight sensation at corporations because of its ability to make rapid calculations based on mathematical relationships


in large databases. Lotus 1-2-3 went far beyond the rudimentary spreadsheets that preceded it by incorporating a database module and graphics capability. In October 1983, investors stampeded for the company's initial public offering of 2.6 million shares at \$18 per share for a total of \$46.8 million. For several years the company had no real competition. By 1992, more than 11 million units of Lotus 1-2-3 had been sold, but the company was unable to solidify its position by developing any new blockbuster products. Microsoft gained on Lotus and eventually passed it with its spreadsheet program Excel. Finally, Lotus developed a hit “groupware” product called Lotus Notes, which boosts productivity by enabling co-workers to share information and work together electronically on complex tasks. The

 large audit firm Coopers & Lybrand (now PricewaterhouseCoopers), for example, networks more than 2,000 auditors all over the world and the knowledge of experts in various parts of the firm via Lotus Notes. Many

 other big companies such as Ford, Unilever, and Citicorp (now Citigroup) are also using Lotus Notes successfully. The success of Lotus Notes attracted the notice of  IBM, which had failed to develop its own  groupware product. In 1995, IBM made a hostile takeover bid for Lotus and bought out the company. In fewer than 15 years, Lotus had gone from an intriguing startup to a mature company with sales of more than \$1 billion and, finally, to a takeover candidate for a giant competitor.

 For more information about Lotus, which is now a division of IBM, visit the company's or IBM's web site through the Needles Accounting Resource Center at: <http://college.hmco.com>

Required

 View the video on Lotus Development Corporation that accompanies this book. As you are watching the video, take notes related to the following questions:

1. All corporations must raise equity capital in the form of common stock. In your own words, what is common stock? What is the relationship of par value to market value of the common stock? What is an initial public offering (IPO)? Why was this IPO important in Lotus's early history?
2. Investors in corporations desire to receive an adequate return on their investment. What are the ways investors can receive a return? In what way did Lotus's shareholders receive a return?
3. From 1991 to 1993, the Lotus board of directors authorized the repurchase of 7,700,000 shares of the company's approximately 44,000,000 shares. What impact will the repurchase of these shares have on the investors' return? What role did the takeover by IBM play in achieving an adequate return to Lotus shareholders?
4. Return on equity is a common measure of management's ability to meet the company's profitability goal. What role do common stock buybacks (purchases of treasury stock) play in the company's increasing return on equity?

The management of contributed capital is a critical component in the financing of a corporation. Important issues faced by management in the area of contributed capital are managing under the corporate form of business, using equity financing, determining dividend policies, and evaluating performance using return on equity.

Forming a Corporation

To form a corporation, most states require individuals, called incorporators, to sign an application and file it with the proper state official. This application contains the **articles of incorporation**. If approved by the state, these articles become, in effect, a contract, called the company charter, between the state and the incorporators. The company is then authorized to do business.

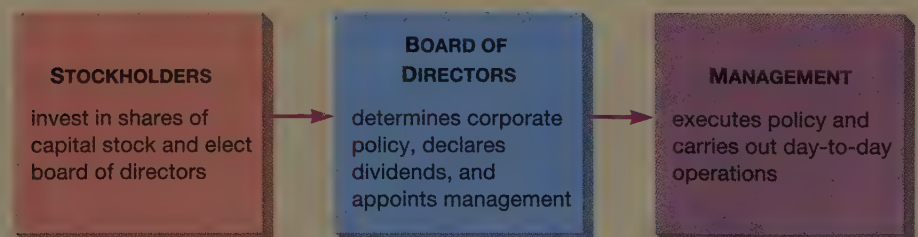
The authority to manage the corporation is delegated by the stockholders to the board of directors and by the board of directors to the corporate officers (see Figure 1). That is, the stockholders elect the board of directors, which sets company policies and chooses the corporate officers, who in turn carry out the corporate policies by managing the business.

STOCKHOLDERS A unit of ownership in a corporation is called a **share of stock**. The articles of incorporation state the maximum number of shares of stock that the corporation will be allowed, or authorized, to issue. The number of shares held by stockholders is the outstanding capital stock; this is generally less than the number authorized in the articles of incorporation. To invest in a corporation, a stockholder transfers cash or other resources to the corporation. In return, the stockholder receives shares of stock representing a proportionate share of ownership in the corporation. The stockholder may then transfer the shares at will. Corporations may have more than one kind of capital stock, but we will refer only to common stock.

BOARD OF DIRECTORS As noted, the stockholders elect the board of directors, which in turn decides on the major business policies of the corporation. Among the specific duties of the board are authorizing contracts, setting executive salaries, and arranging major loans with banks. The declaration of dividends is also an important function. Only the board has the authority to declare dividends. **Dividends** are distributions of resources, generally in the form of cash, to the stockholders. Paying dividends is one way of rewarding stockholders for their investment when the corporation has been successful in earning a profit. (The other way is through a rise in the market value of the stock.) There is usually a delay of two or three weeks between the time the board declares a dividend and the date of the actual payment.

The board of directors varies in composition from company to company, but it usually contains several corporate officers and several outsiders. Today, the formation of an **audit committee** with several outside directors is encouraged to make sure that the board will be objective in evaluating management's performance. One function of the audit committee is to engage the company's independent auditors and review their work. Another is to ensure that proper systems safeguard the company's resources and that reliable accounting records are kept.

Figure 1
The Corporate Form of Business



MANAGEMENT The board of directors appoints managers to carry out the corporation's policies and run day-to-day operations. The management consists of the operating officers, who are generally the president, vice presidents, controller, treasurer, and secretary. Besides being responsible for running the business, management has the duty of reporting the financial results of its administration to the board of directors and the stockholders. Though management must, at a minimum, make a comprehensive annual report, it may and generally does report more often. The annual reports of large public corporations are available to the public. Excerpts from many of them are used throughout this book.

Managing Under the Corporate Form of Business

Although sole proprietorships and partnerships outnumber corporations in the United States, corporations dominate the economy in total dollars of assets and output of goods and services. Corporations are well suited to today's trends toward large organizations, international trade, and professional management. Figure 2 shows the amount and sources of new funds raised by corporations in recent years. The amount raised increased dramatically after 1990. In 1998, the amount of new corporate capital was \$1,802 billion, of which \$1,650 billion, or 92 percent, came

Figure 2
Sources of Capital Raised
by Corporations in the
United States



Source: Data from *Securities Industry Yearbook 1999–2000* (New York: Securities Industry Association, 1999), p. 1001.

from new bond issues; \$114 billion, or 6 percent, came from new common stock issues; and \$38 billion, or 2 percent, came from preferred stock issues.

In managing the corporation, the advantages and disadvantages of this form of business must be considered. Some of the advantages are as follows.

- **SEPARATE LEGAL ENTITY** A corporation is a separate legal entity that has most of the rights of a person except those such as voting and marrying. As such, a corporation can buy, sell, or own property; sue and be sued; enter into contracts; hire and fire employees; and be taxed.
- **LIMITED LIABILITY** Because a corporation is a separate legal entity, it is responsible for its own actions and liabilities. This means that a corporation's creditors can satisfy their claims only against the assets of the corporation, not against the personal property of the corporation's owners. Because the owners are not responsible for the corporation's debts, their liability is limited to the amount of their investment. The personal property of sole proprietors and partners, however, generally is available to creditors.
- **EASE OF CAPITAL GENERATION** It is fairly easy for a corporation to raise capital because shares of ownership in the business are available to a great number of potential investors for a small amount of money. As a result, a single corporation can be owned by many people.
- **EASE OF TRANSFER OF OWNERSHIP** A share of stock, a unit of ownership in a corporation, is transferable. A stockholder can normally buy and sell shares without affecting the corporation's activities or needing the approval of other owners.
- **LACK OF MUTUAL AGENCY** There is no mutual agency in the corporate form of business. If a stockholder, acting as an owner, tries to enter into a contract for the corporation, the corporation is not bound by the contract. But in a partnership, because of mutual agency, all the partners can be bound by one partner's actions.
- **CONTINUOUS EXISTENCE** Because a corporation is a separate legal entity, an owner's death, incapacity, or withdrawal does not affect the life of the corporation. The life of a corporation is set by its charter and regulated by state laws.
- **CENTRALIZED AUTHORITY AND RESPONSIBILITY** The board of directors represents the stockholders and delegates the responsibility and authority for the day-to-day operation of the corporation to a single person, usually the president. Operating power is not divided among the many owners of the business. The president may delegate authority over certain segments of the business to others, but he or she is held accountable to the board of directors. If the board is dissatisfied with the performance of the president, it can replace him or her.
- **PROFESSIONAL MANAGEMENT** Large corporations are owned by many people, the vast majority of whom are unequipped to make timely decisions about business operations. So, in most cases, management and ownership are separate. This allows a corporation to hire the best talent available to manage the business.

The disadvantages of the corporation are as follows.

- **GOVERNMENT REGULATION** Corporations must meet the requirements of state laws. As "creatures of the state," corporations are subject to greater control and regulation by the state than are other forms of business. Corporations must file many reports with the state in which they are chartered. Also, corporations that are publicly held must file reports with the Securities and Exchange Commission and with the stock exchanges. Meeting those requirements is very costly.

TAXATION A major disadvantage of the corporate form of business is **double taxation**. Because a corporation is a separate legal entity, its earnings are subject to federal and state income taxes, which may be as much as 35 percent of corporate earnings. If any of the corporation's after-tax earnings are then paid out as dividends, the earnings are taxed again as income to the stockholders. In contrast, the earnings of sole proprietorships and partnerships are taxed only once, as personal income to the owners.

LIMITED LIABILITY Above, we cited limited liability as an advantage of incorporation, but it also can be a disadvantage. Limited liability restricts the ability of a small corporation to borrow money. Because creditors can lay claim only to the assets of the corporation, they limit their loans to the level secured by those assets or ask stockholders to guarantee the loans personally.

SEPARATION OF OWNERSHIP AND CONTROL Just as limited liability can be a drawback, so can the separation of ownership and control. Sometimes management makes decisions that are not good for the corporation as a whole. Poor communication can also make it hard for stockholders to exercise control over the corporation or even to recognize that management's decisions are harmful.

Using Equity Financing

A share of stock is a unit of ownership in a corporation. A **stock certificate** is issued to the owner. It shows the number of shares of the corporation's stock owned by the stockholder. Stockholders can transfer their ownership at will. When they do, they must sign their stock certificate and send it to the corporation's secretary. In large corporations that are listed on the organized stock exchanges, stockholders' records are hard to maintain. Such companies can have millions of shares of stock, thousands of which change ownership every day. Therefore, they often appoint independent registrars and transfer agents (usually banks and trust companies) to help perform the secretary's duties. The outside agents are responsible for transferring the corporation's stock, maintaining stockholders' records, preparing a list of stockholders for stockholders' meetings, and paying dividends.

When a corporation applies for a charter, the articles of incorporation specify the maximum number of shares of stock the corporation is allowed to issue. This number represents **authorized stock**. Most corporations are authorized to issue more shares of stock than are necessary at the time of organization, which allows for future stock issues to raise additional capital. For example, if a corporation plans to expand in the future, it will be able to sell the unissued shares of stock that were authorized in its charter. If a corporation immediately issues all of its authorized stock, it cannot issue more stock unless it applies to the state for a change in its charter.

The charter also shows the par value of the stock that has been authorized. **Par value** is an arbitrary amount assigned to each share of stock. It must be recorded in the capital stock accounts and constitutes the legal capital of a corporation. **Legal capital** equals the number of shares issued times the par value; it is the minimum amount that can be reported as contributed capital. Par value usually bears little if any relationship to the market value or book value of the shares. When a corporation is formed, a memorandum entry can be made in the general journal giving the number and description of authorized shares.

To help with the initial issue of capital stock, called an **initial public offering (IPO)**, a corporation often uses an **underwriter**—an intermediary between the corporation and the investing public. For a fee—usually less than 1 percent of the selling price—the underwriter guarantees the sale of the stock. The corporation records the amount of the net proceeds of the offering—what the public paid less



the underwriter's fee, legal and printing expenses, and any other direct costs of the offering—in its capital stock and additional paid-in capital accounts. In one of the most unique IPOs, Goldman, Sachs, & Co., the renowned 130-year-old investment bank, went public in one of the largest IPOs ever of about \$3.6 billion.

Determining Dividend Policies

The board of directors has sole authority to declare dividends, but the dividend policies are influenced by senior managers, who usually serve as members of the board. Receiving dividends from a corporation is one of the two ways stockholders can earn a return on their investment in the company. The other way is to sell their shares of stock for more than they paid for them. Investors evaluate the amount of dividends received with the ratio **dividends yield**. Dividends yield measures the current return to an investor in the form of dividends and is computed by dividing the dividends per share by the market price per share. For instance, the dividends yield (shown in Figure 3) for Abbott Laboratories, a large, successful pharmaceutical company, is computed as follows:



$$\text{Dividends Yield} = \frac{\text{Dividends per Share}}{\text{Market Price per Share}} = \frac{\$.76}{\$42.75} = 1.8\%$$

Since the yield on corporate bonds exceeds 8 percent, the shareholders of Abbott Labs must expect some of their return to come from increases in the price of the shares. A measure of investors' confidence in a company's future is the **price/earnings (P/E) ratio**, which is calculated by dividing the market price per share by the earnings per share. The price/earnings ratio will vary as market price per share fluctuates daily and the amount of earnings per share changes. From Figure 3, the price/earnings ratio for Abbott Labs is 27 times, which was computed by using its most recent annual earnings per share, as follows:



$$\text{Price/Earnings (P/E) Ratio} = \frac{\text{Market Price per Share}}{\text{Earnings per Share}} = \frac{\$42.75}{\$1.58} = 27 \text{ times}$$

Figure 3
Stock Quotations on the New
York Stock Exchange

NYSE COMPOSITE TRANSACTIONS													
52 Weeks			Yld			Vol			Net				
Hi	Lo	Stock	Sym	Div	% PE	100's	Hi	Lo	Close	Chg			
61	34 ¹ / ₁₆	AT&T	T	.88	2.6	18	186 ⁷ / ₁₆	34 ¹ / ₁₆	33 ⁵ / ₁₆	34	—	1 ³ / ₁₆	
100	19 ¹ / ₁₆	AVX Cp	AVX	.28	.5	32	6532	61 ³ / ₁₆	56 ¹ / ₁₆	57 ³ / ₄	—	3 ¹ / ₄	
79 ¹ / ₁₆	53 ³ / ₄	AXA ADS	AXA	2.16e	3.2	...	1147	68 ¹ / ₁₆	67 ¹ / ₄	67 ⁹ / ₁₆	+	27 ¹ / ₁₆	
39 ⁷ / ₁₆	25 ¹ / ₂	AXA Fnl	AXF	.10	.3	15	16294	40 ³ / ₁₆	37 ¹ / ₁₆	39 ³ / ₁₆	+	1 ¹ / ₂	
9 ⁵ / ₁₆	1	AamesFnl	AAM	...	dd	1181	1 ¹ / ₁₆	1 ³ / ₁₆	1 ⁵ / ₁₆	—	1 ¹ / ₁₆		
22 ¹ / ₄	12 ¹ / ₂	AaronRent	RNT	.04	.3	10	293	13	12 ⁹ / ₁₆	12 ⁷ / ₁₆	...		
20	14 ⁵ / ₁₆	AaronRent A	RNTA	.04	.3	14	8	15 ⁵ / ₁₆	15 ⁵ / ₁₆	15 ⁵ / ₁₆	—	5 ⁵ / ₁₆	
24 ¹ / ₁₆	19	AbbeyNtl	SUA	1.75	8.9	...	83	19 ⁷ / ₁₆	19 ⁵ / ₁₆	19 ¹ / ₁₆	—	1 ¹ / ₁₆	
23 ¹ / ₁₆	19 ¹ / ₂	AbbeyNtl 7 ¹ / ₄ %	SUD	1.81	8.7	...	77	20 ¹ / ₁₆	20 ⁷ / ₁₆	20 ¹ / ₁₆	+	1 ¹ / ₄	
26 ⁵ / ₁₆	22 ¹ / ₈	AbbeyNtl pfA		2.19	9.3	...	642	23 ⁷ / ₁₆	23 ¹ / ₄	23 ⁷ / ₁₆	+	1 ¹ / ₁₆	
45 ¹ / ₁₆	29 ³ / ₁₆	AbbottLab	ABT	.76f	1.8	27	29393	43 ¹ / ₄	42 ¹ / ₂	42 ³ / ₄	—	183 ¹ / ₁₆	
49 ¹ / ₁₆	8	Abercrombie A	ANF	...	...	6	22687	9 ¹ / ₁₆	8 ¹ / ₁₆	8 ⁷ / ₁₆	+	1 ¹ / ₁₆	
13 ¹ / ₁₆	7 ³ / ₄	Abitibi g	ABY	.40g	...	...	2099	10 ⁵ / ₁₆	10	10 ¹ / ₁₆	—	1 ¹ / ₁₆	
6 ¹ / ₁₆	4 ³ / ₁₆	AcadiaRlty	AKR	.48	8.2	18	27	5 ⁷ / ₁₆	5 ⁷ / ₁₆	5 ⁷ / ₁₆	—	1 ¹ / ₁₆	
15 ¹ / ₁₆	2 ³ / ₄	Acceptins	ALF	...	dd	184	4 ⁵ / ₁₆	4 ³ / ₁₆	4 ¹ / ₂	4 ¹ / ₂	—	1 ¹ / ₁₆	
20	11 ¹ / ₁₆	AckryGp	AK	.02	.2	...	136	12 ⁹ / ₁₆	12 ¹ / ₁₆	12 ¹ / ₁₆	—	1 ¹ / ₄	
32 ³ / ₄	16 ⁵ / ₁₆	ACNielsen	ART	...	19	980	23 ³ / ₁₆	22 ³ / ₁₆	22 ³ / ₁₆	22 ³ / ₁₆	—	1 ¹ / ₁₆	

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Since the market price is 27 times earnings, investors are paying what for most companies would be a high price in relation to earnings, expecting this drug company to continue its success. Caution must be taken in interpreting high P/E ratios because unusually low earnings can produce a high result.



Companies usually pay dividends to stockholders only when they have experienced profitable operations. For example, Apple Computer, Inc., paid a dividend beginning in 1987 but suspended its dividend payments in 1996 to conserve cash after large operating losses in 1995. Factors other than earnings affect the decision to pay dividends. First, the expected volatility of earnings is a factor. If a company has years of good earnings followed by years of poor earnings, the board may want to keep dividends low to avoid giving a false impression of sustained high earnings. For years General Motors Corporation followed the practice of having a fairly stable dividend yield and paying a bonus dividend in especially good years. Second, the level of dividends affects cash flows. Some companies may not have the cash to pay higher dividends because operations are not generating cash at the level of earnings or because the companies are investing the cash in future operations. For instance, Abbott Labs pays a dividend of only \$.76 per share in spite of earning \$1.58 per share. Management believes the cash generated by the earnings is better spent for other purposes, such as researching and developing new drugs that will generate revenue in the future. It is partly due to Abbott's investment in new products that stockholders are willing to pay a high price for Abbott Labs stock. In recent years, many investors have shown a preference for companies like Abbott that have strong earnings growth but that pay low or no dividends because the tax rates favor capital gains made by selling shares for a profit over dividend income.

Evaluating Performance Using Return on Equity



The ratio **return on equity** is the most important ratio associated with the stockholders' equity section because it is a common measure of management's performance. For instance, when *Business Week* and *Forbes* rate companies on their success, return on equity is the major basis of this evaluation. Also, the compensation of top executives is often tied to return on equity benchmarks. This ratio is computed for Abbott Labs from information in the company's 1999 annual report, as follows:



$$\begin{aligned}\text{Return on Equity} &= \frac{\text{Net Income}}{\text{Average Stockholders' Equity}} \\ &= \frac{\$2,445,759,000}{(\$7,427,595,000 + \$5,753,591,000) \div 2} \\ &= 37.1\%\end{aligned}$$

Abbott Labs' healthy return on equity of 37.1 percent depends, of course, on the amount of net income the company earns, but it also depends on the level of stockholders' equity. This level can be affected by management decisions. First, it depends on the amount of stock a company sells to the public. Management can keep the stockholders' equity at a minimum by financing the business with cash flows from operations and with debt instead of with stock. However, the use of debt to finance the business increases a company's risk because the interest and principal of the debt must be paid in a timely manner. In the case of common stock, dividends may be suspended if there is a cash shortage. Abbott Labs has a debt to equity ratio of over 1.3 and thus is taking advantage of the leverage provided by debt. Second, management can reduce the number of shares in the hands of the public by buying back its shares on the open market. The cost of these shares, which are called *treasury stock*, has the effect of reducing the amount of stockholders' equity and thereby increasing the return on equity. Many companies follow

this practice instead of paying or increasing dividends because it puts money into the hands of stockholders in the form of market price appreciation without creating a commitment to higher dividends in the future. For example, during the three years ended 1999, Abbott Labs purchased its common stock at a cost of \$1.9 billion.³ Abbott Labs' stock repurchases improved the company's return on equity, increased its earnings per share, and lowered its price/earnings ratio.

Start-up and Organization Costs

OBJECTIVE

2 Define *start-up and organization costs* and state their effects on financial reporting

The costs of forming a corporation are called **start-up and organization costs**. Such costs, which are incurred before the corporation begins operations, include state incorporation fees and attorneys' fees for drawing up the articles of incorporation. They also include the cost of printing stock certificates, accountants' fees for services rendered in registering the firm's initial stock, and other expenditures necessary for forming the corporation.

Theoretically, start-up and organization costs benefit the entire life of the corporation. For that reason, a case can be made for recording them as intangible assets and amortizing them over the years of the life of the corporation. However, the life of a corporation normally is not known, so accountants expense start-up and organization costs as they are incurred.⁴

Components of Stockholders' Equity

OBJECTIVE

3 Identify the components of stockholders' equity

In a corporation's balance sheet, the owners' claims to the business are called *stockholders' equity*. Look at the sample stockholders' equity section of a balance sheet that follows.

Stockholders' Equity			
Contributed Capital			
Preferred Stock, \$50 par value, 1,000 shares authorized, issued, and outstanding			\$ 50,000
Common Stock, \$5 par value, 30,000 shares authorized, 20,000 shares issued and outstanding	\$100,000		
Paid-in Capital in Excess of Par Value, Common	50,000	150,000	
Total Contributed Capital			\$200,000
Retained Earnings			60,000
Total Stockholders' Equity			\$260,000

Notice that the equity section of the corporate balance sheet is divided into two parts: (1) contributed capital and (2) retained earnings. Contributed capital represents the investments made by the stockholders in the corporation. Retained earnings are the earnings of the corporation since its inception, less any losses, dividends, or transfers to contributed capital. Retained earnings are not a pool of funds to be distributed to the stockholders; they represent, instead, earnings reinvested in the corporation.

FOCUS ON INTERNATIONAL BUSINESS

To make available capital for European companies, a new series of exchanges are rising up around Europe. France's Nouveau Marche and Germany's Neuer Markt

are two of four specialized markets set up by Europe's stock exchanges since 1996 to bring capital to cash-starved growth-stock companies. More than 160 companies have gone public via the "Euro new market" network. Most of the ownership of these stocks is with individual investors, not institutional fund managers, as is the case in the United States.⁵

In keeping with the convention of full disclosure, the contributed-capital part of the stockholders' equity section of the balance sheet gives a great deal of information about the corporation's stock: the kinds of stock; their par value; and the number of shares authorized, issued, and outstanding.

Common Stock

A corporation can issue two basic types of stock: common stock and preferred stock. If only one kind of stock is issued by the corporation, it is called **common stock**. Common stock is the company's **residual equity**. This means that all other creditors' and preferred stockholders' claims to the company's assets rank ahead of those of the common stockholders in case of liquidation. Because common stock is generally the only stock that carries voting rights, it represents the means of controlling the corporation.

The **issued stock** of a corporation is the shares sold or otherwise transferred to stockholders. For example, a corporation can be authorized to issue 500,000 shares of stock but may choose to issue only 300,000 shares when the company is organized. The holders of those 300,000 shares own 100 percent of the corporation. The remaining 200,000 shares of stock are unissued shares. No rights or privileges are associated with them until they are issued.

Outstanding stock is stock that has been issued and is still in circulation. A share of stock is not outstanding if the issuing corporation has repurchased it or if a stockholder has given it back to the company that issued it, so a company can have more shares issued than are currently outstanding. Issued shares that are bought back and held by the corporation are called *treasury stock*, which we discuss in detail later in this chapter. The relationship of authorized, issued, unissued, outstanding, and treasury shares is illustrated in Figure 4.

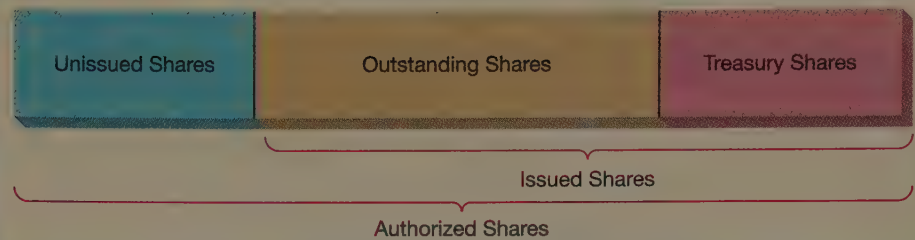
Dividends

OBJECTIVE

4 Account for cash dividends

Dividends can be paid quarterly, semiannually, annually, or at other times decided on by the board. Most states do not allow the board to declare a dividend that exceeds retained earnings. When a dividend that exceeds retained earnings is declared, the corporation is, in essence, returning to the stockholders part of their contributed capital. It is called a **liquidating dividend** and is usually paid when a company is going out of business or reducing its operations. Having sufficient retained earnings in itself does not justify the distribution of a dividend. If cash or other readily distributable assets are not available for distribution, the company might have to borrow money to pay a dividend—an action most boards of directors want to avoid.

Figure 4
**Relationship of Authorized,
 Unissued, Issued, Outstanding,
 and Treasury Shares**



There are three important dates associated with dividends. In order of occurrence, they are (1) the date of declaration, (2) the date of record, and (3) the date of payment. The **date of declaration** is the date on which the board of directors formally declares that a dividend is going to be paid. The **date of record** is the date on which ownership of the stock of a company, and therefore of the right to receive a dividend, is determined. Individuals who own the stock on the date of record will receive the dividend. Between that date and the date of payment, the stock is said to be **ex-dividend**. If the owner on the date of record later sells the shares of stock, the right to the cash dividend remains with that person; it does not transfer with the shares to the second owner. The **date of payment** is the date on which the dividend is paid to the stockholders of record.

To illustrate the accounting for cash dividends, we assume that the board of directors has decided that sufficient cash is available to pay a \$56,000 cash dividend to the common stockholders. The process has two steps. First, the board declares the dividend as of a certain date. Second, the dividend is paid. Assume that the dividend is declared on February 21, 20xx, for stockholders of record on March 1, 20xx, to be paid on March 11, 20xx. Here are the entries to record the declaration and payment of the cash dividend.

Date of Declaration				
A = L + OE + -	Feb. 21	Cash Dividends Declared	56,000	
		Cash Dividends Payable		56,000
		Declared cash dividend		
		to common stockholders		

Date of Record	
Mar. 1	No entry is required. This date is used simply to determine the owners of the stock who will receive the dividends. After this date (starting March 2), the shares are ex-dividend.

Date of Payment				
A = L + OE - -	Mar. 11	Cash Dividends Payable	56,000	
		Cash		56,000
		Paid cash dividends		
		declared on February 21		

Notice that the liability for the dividend is recorded on the date of declaration because the legal obligation to pay the dividend is established on that date. No entry is required on the date of record. The liability is liquidated, or settled, on the date of payment. The Cash Dividends Declared account is a temporary stockholders' equity account that is closed at the end of the accounting period by debiting Retained Earnings and crediting Cash Dividends Declared. Retained Earnings are thereby reduced by the total dividends declared during the period.



Some companies do not pay dividends. A company may not have any earnings, or the cash generated by operations may need to be kept in the company for business purposes, perhaps expansion of the plant. Investors in growth companies expect a return on their investment in the form of an increase in the market value of their stock.

Preferred Stock

OBJECTIVE

5 Identify the characteristics of preferred stock, including the effect on distribution of dividends

The second kind of stock a company can issue is called **preferred stock**. Preferred stock has preference over common stock in one or more areas. Most preferred stock has one or more of the following characteristics: preference as to dividends, preference as to assets of the business in liquidation, convertibility, and a callable option. Both common stock and preferred stock are sold to raise money. But investors in preferred stock and investors in common stock have different investment goals. In fact, a corporation may offer several different classes of preferred stock, each with distinctive characteristics to attract different investors.

PREFERENCE AS TO DIVIDENDS Preferred stocks ordinarily have a preference over common stock in the receipt of dividends; that is, the holders of preferred shares must receive a certain amount of dividends before the holders of common shares can receive dividends. The amount that preferred stockholders must be paid before common stockholders can be paid is usually stated in dollars per share or as a percentage of the par value of the preferred shares. For example, a corporation can issue a preferred stock and pay an annual dividend of \$4 per share, or it might issue a preferred stock at \$50 par value and pay a yearly dividend of 8 percent of par value, also \$4 per share.

Preferred stockholders have no guarantee of ever receiving dividends. The company must have earnings and the board of directors must declare dividends on preferred shares before any liability arises. The consequences of not declaring a dividend to preferred stockholders in the current year vary according to the exact terms under which the shares were issued. In the case of **noncumulative preferred stock**, if the board of directors fails to declare a dividend to preferred stockholders in a given year, the company is under no obligation to make up the missed dividend in future years. In the case of **cumulative preferred stock**, however, the fixed dividend amount per share accumulates from year to year, and the whole amount must be paid before any common dividends can be paid. Dividends not paid in the year they are due are called **dividends in arrears**.

Assume that a corporation has been authorized to issue 10,000 shares of \$100 par value, 5 percent cumulative preferred stock, and that the shares have been issued and are outstanding. If no dividends were paid in 20x1, at the end of the year there would be preferred dividends of \$50,000 ($10,000 \text{ shares} \times \$100 \times .05 = \$50,000$) in arrears. If dividends are paid in 20x2, the preferred stockholders' dividends in arrears plus the 20x2 preferred dividends must be paid before any dividends on common stock can be paid.

Dividends in arrears are not recognized as liabilities because no liability exists until the board declares a dividend. A corporation cannot be sure it is going to make a profit, so, of course, it cannot promise dividends to stockholders. However, if a company has dividends in arrears, the amount should be reported either in the body of the financial statements or in a note. The following note appeared in a steel company's annual report.

On January 1, 20xx, the company was in arrears by \$37,851,000 (\$1.25 per share) on dividends to its preferred stockholders. The company must pay all

dividends in arrears to preferred stockholders before paying any dividends to common stockholders.

Suppose that on January 1, 20x1, a corporation issued 10,000 shares of \$10 par, 6 percent cumulative preferred stock and 50,000 shares of common stock. The first year's operations resulted in income of only \$4,000. The corporation's board of directors declared a \$3,000 cash dividend to the preferred stockholders. The dividend picture at the end of 20x1 was as follows:

20x1 dividends due preferred stockholders (\$100,000 × .06)	\$6,000
Less 20x1 dividends declared to preferred stockholders	<u>3,000</u>
20x1 preferred stock dividends in arrears	<u>\$3,000</u>

Now, suppose that in 20x2 the company earned income of \$30,000 and wanted to pay dividends to both the preferred and the common stockholders. Because the preferred stock is cumulative, the corporation must pay the \$3,000 in arrears on the preferred stock, plus the current year's dividends on its preferred stock, before it can distribute a dividend to the common stockholders. For example, assume that the corporation's board of directors declared a \$12,000 dividend to be distributed to preferred and common stockholders. It would be distributed as follows:

20x2 declaration of dividends	\$12,000
Less 20x1 preferred stock dividends in arrears	<u>3,000</u>
Available for 20x2 dividends	\$ 9,000
Less 20x2 dividends due preferred stockholders (\$100,000 × .06)	<u>6,000</u>
Remainder available to common stockholders	<u>\$ 3,000</u>

And this is the journal entry when the dividend is declared:

A = L + OE + -	Dec. 31	Cash Dividends Declared	12,000	
		Cash Dividends Payable		12,000
		Declared a \$9,000 cash dividend to preferred stockholders and a \$3,000 cash dividend to common stockholders		

PREFERENCE AS TO ASSETS Many preferred stocks have preference in terms of the assets of the corporation in the case of liquidation. If the corporation's existence is terminated, the preferred stockholders have a right to receive the par value of their stock or a larger stated liquidation value per share before the common stockholders receive any share of the company's assets. This preference can also include any dividends in arrears owed to the preferred stockholders.

CONVERTIBLE PREFERRED STOCK A corporation can make its preferred stock more attractive to investors by adding convertibility. People who hold **convertible preferred stock** can exchange their shares of preferred stock for shares of the company's common stock at a ratio stated in the preferred stock contract. Convertibility appeals to investors for two reasons. First, like all preferred stockholders, owners of convertible stock are more likely to receive regular dividends than are common stockholders. Second, if the market value of a company's common stock rises, the conversion feature allows the preferred stockholders to share in the increase. The rise in value would come either through increases in the value of the preferred stock or through conversion to common stock.

FOCUS ON BUSINESS PRACTICE

Preferred stock represents a flexible means of achieving goals that cannot be achieved with common stock. For example, Microsoft Corporation issued almost \$1 billion in preferred stock even though the company probably did not need the cash.⁶ Since Microsoft does not pay and has no plans to pay a dividend on its common stock, this preferred stock satisfies the desire

of investors who want to own Microsoft stock but who want to buy stocks that pay a dividend. The preferred stock pays a fixed dividend and is convertible into common stock or convertible notes, or the company guarantees it can be redeemed at face value for cash in three years. In return for this flexibility and low risk, the possible gain of converting the preferred stock into common stock is limited to 25 to 30 percent. A Microsoft vice president said, "If you own the preferred, you get a dividend yield and downside protection, but the upside is capped."⁷

For example, suppose that a company issues 1,000 shares of 8 percent, \$100 par value convertible preferred stock for \$100 per share. Each share of stock can be converted into five shares of the company's common stock at any time. The market value of the common stock is now \$15 per share. In the past, an owner of the common stock could expect dividends of about \$1 per share per year. The owner of one share of preferred stock, on the other hand, now holds an investment that is approaching a value of \$100 on the market and is more likely to receive dividends than is the owner of common stock.

Assume that in the next several years, the corporation's earnings increase, and the dividends paid to common stockholders also increase, to \$3 per share. In addition, assume that the market value of a share of common stock rises from \$15 to \$30. Preferred stockholders can convert each of their preferred shares into five common shares and increase their dividends from \$8 on each preferred share to the equivalent of \$15 (\$3 on each of five common shares). Furthermore, the market value of each share of preferred stock will be close to the \$150 value of the five shares of common stock because each share can be converted into five shares of common stock.

CALLABLE PREFERRED STOCK Most preferred stock is **callable preferred stock**. That is, it can be redeemed or retired at the option of the issuing corporation at a price stated in the preferred stock contract. A stockholder must surrender nonconvertible preferred stock to the corporation when asked to do so. If the preferred stock is convertible, the stockholder can either surrender the stock to the corporation or convert it into common stock when the corporation calls the stock. The *call price*, or redemption price, is usually higher than the par value of the stock. For example, a \$100 par value preferred stock might be callable at \$103 per share. When preferred stock is called and surrendered, the stockholder is entitled to (1) the par value of the stock, (2) the call premium, (3) any dividends in arrears, and (4) a portion of the current period's dividend, prorated by the proportion of the year to the call date.

A corporation may call its preferred stock for several reasons. First, the company may want to force conversion of the preferred stock to common stock because the cash dividend paid on the equivalent common stock is lower than the dividend paid on the preferred shares. Second, it may be possible to replace the outstanding preferred stock on the current market with a preferred stock at a lower dividend rate or with long-term debt, which can have a lower after-tax cost. Third, the company may simply be profitable enough to retire the preferred stock.

Accounting for Stock Issuance

OBJECTIVE

6 Account for the issuance of stock for cash and other assets

A share of capital stock may be either par or no-par. The value of par stock is stated in the corporate charter and must be printed on each share of stock. Par value can be \$.10, \$1, \$5, \$100, or any other amount established by the organizers of the corporation. The par values of common stocks tend to be lower than those of preferred stocks.

Par value is the amount per share that is entered into the corporation's capital stock accounts and that makes up the legal capital of the corporation. A corporation cannot declare a dividend that would cause stockholders' equity to fall below the legal capital of the firm. Therefore, the par value is a minimum cushion of capital that protects creditors. Any amount in excess of par value received from the issuance of stock is recorded in the Paid-in Capital in Excess of Par Value account and represents a portion of the company's contributed capital.

No-par stock is capital stock that does not have a par value. There are several reasons for issuing stock without a par value. One is that some investors confuse par value with the market value of stock instead of recognizing it as an arbitrary figure. Another reason is that most states do not allow an original stock issue below par value and thereby limit a corporation's flexibility in obtaining capital.

No-par stock can be issued with or without a stated value. The board of directors of a corporation issuing no-par stock may be required by state law to place a **stated value** on each share of stock or may choose to do so as a matter of convenience. The stated value can be any value set by the board, although some states specify a minimum amount. The stated value can be set before or after the shares are issued if the state law is not specific.

If a company issues no-par stock without a stated value, all proceeds are recorded in the Capital Stock account. That amount becomes the corporation's legal capital unless a different amount is specified by state law. Because additional shares of the stock can be issued at different prices, the per-share credit to the Capital Stock account will not be uniform. This is a key way in which no-par stock without a stated value differs from par value stock or no-par stock with a stated value.

When no-par stock with a stated value is issued, the shares are recorded in the Capital Stock account at the stated value. Any amount that is received in excess of the stated value is recorded in the Paid-in Capital in Excess of Stated Value account. The amount in excess of the stated value is part of the corporation's contributed capital. However, the stated value is normally considered to be the legal capital of the corporation.

Par Value Stock

When par value stock is issued, the appropriate capital stock account (usually Common Stock or Preferred Stock) is credited for the par value regardless of whether the proceeds are more or less than the par value. For example, assume that Bradley Corporation is authorized to issue 20,000 shares of \$10 par value common stock and actually issues 10,000 shares at \$10 per share on January 1, 20xx. The entry to record the stock issue at par value would be as follows:

A = L + OE	Jan. 1	Cash	100,000	
+		Common Stock		100,000
+		Issued 10,000 shares of \$10 par value common stock for \$10 per share		

Cash is debited for \$100,000 (10,000 shares × \$10), and Common Stock is credited for an equal amount because the stock was sold for par value.

When stock is issued for a price greater than par, the proceeds in excess of par are credited to a capital account called Paid-in Capital in Excess of Par Value, Common. For example, assume that the 10,000 shares of Bradley common stock sold for \$12 per share on January 1, 20xx. The entry to record the issuance of the stock at the price in excess of par value would be as follows:

A = L + OE + + +	Jan. 1	Cash	120,000	
		Common Stock		100,000
		Paid-in Capital in Excess of Par Value, Common		20,000
		Issued 10,000 shares of \$10 par value common stock for \$12 per share		

Cash is debited for the proceeds of \$120,000 (10,000 shares × \$12), and Common Stock is credited for the total par value of \$100,000 (10,000 shares × \$10). Paid-in Capital in Excess of Par Value, Common is credited for the difference of \$20,000 (10,000 shares × \$2). The amount in excess of par value is part of the corporation’s contributed capital and will be included in the stockholders’ equity section of the balance sheet. The stockholders’ equity section for Bradley Corporation immediately following the stock issue would appear as follows:

Contributed Capital		
Common Stock, \$10 par value, 20,000 shares authorized, 10,000 shares issued and outstanding		\$100,000
Paid-in Capital in Excess of Par Value, Common		20,000
Total Contributed Capital		\$120,000
Retained Earnings		—
Total Stockholders’ Equity		\$120,000

If a corporation issues stock for less than par, an account called Discount on Capital Stock is debited for the difference. The issuance of stock at a discount rarely occurs because it is illegal in many states.

No-Par Stock

As mentioned earlier, stock can be issued without a par value. However, most states require that all or part of the proceeds from the issuance of no-par stock be designated as legal capital, which cannot be withdrawn except in liquidation. The purpose of this requirement is to protect the corporation’s assets for creditors. Assume that Bradley Corporation’s capital stock is no-par common and that 10,000 shares are issued on January 1, 20xx, at \$15 per share. The \$150,000 (10,000 shares × \$15) in proceeds would be recorded as shown in the following entry:

A = L + OE + + +	Jan. 1	Cash	150,000	
		Common Stock		150,000
		Issued 10,000 shares of no-par common stock for \$15 per share		

Because the stock does not have a stated or par value, all proceeds of the issue are credited to Common Stock and are part of the company’s legal capital.

Most states allow the board of directors to put a stated value on no-par stock, and that value represents the corporation’s legal capital. Assume that Bradley’s board puts a \$10 stated value on its no-par stock. The entry to record the issue of

10,000 shares of no-par common stock with a \$10 stated value for \$15 per share would appear as follows:

$A = L + OE$ $+$	Jan. 1	Cash	150,000	
		Common Stock		100,000
		Paid-in Capital in Excess of		
		Stated Value, Common		50,000
		Issued 10,000 shares of no-par common stock with \$10 stated value for \$15 per share		

Notice that the legal capital credited to Common Stock is the stated value decided by the board of directors. Notice also that the account Paid-in Capital in Excess of Stated Value, Common is credited for \$50,000. The \$50,000 is the difference between the proceeds (\$150,000) and the total stated value (\$100,000). Paid-in Capital in Excess of Stated Value is presented on the balance sheet in the same way as Paid-in Capital in Excess of Par Value.

Issuance of Stock for Noncash Assets

Stock can be issued for assets or services other than cash. The problem is to determine the dollar amount that should be recorded for the exchange. The generally preferred rule is to record the transaction at the fair market value of what the corporation is giving up—in this case, the stock. If the fair market value of the stock cannot be determined, the fair market value of the assets or services received can be used. Transactions of this kind usually involve the use of stock to pay for land or buildings or for the services of attorneys and others who helped organize the company.

When there is an exchange of stock for noncash assets, the board of directors has the right to determine the fair market value of the property. Suppose that when Bradley Corporation was formed on January 1, 20xx, its attorney agreed to accept 100 shares of its \$10 par value common stock for services rendered. At the time the stock was issued, its market value could not be determined. However, for similar services the attorney would have billed the company \$1,500. The entry to record the noncash transaction is as follows:

$A = L + OE$ $+$	Jan. 1	Start-up and Organization Expense	1,500	
		Common Stock		1,000
		Paid-in Capital in Excess of		
		Par Value, Common		500
		Issued 100 shares of \$10 par value common stock for attorney's services		

Now suppose that two years later Bradley Corporation exchanged 1,000 shares of its \$10 par value common stock for a piece of land. At the time of the exchange, the stock was selling on the market for \$16 per share. The following entry records the exchange:

$A = L + OE$ $+$	Jan. 1	Land	16,000	
		Common Stock		10,000
		Paid-in Capital in Excess of		
		Par Value, Common		6,000
		Issued 1,000 shares of \$10 par value common stock with a market value of \$16 per share for a piece of land		

Treasury Stock

OBJECTIVE

7 Account for treasury stock



Treasury stock is capital stock, either common or preferred, that has been issued and later reacquired by the issuing company but that has not subsequently been resold or retired. The company normally gets the stock back by purchasing the shares on the market. It is common for companies to buy and hold their own stock. In a recent year, 392, or 65 percent, of 600 large companies held treasury stock.⁸ Although the purchase of treasury stock can be a severe drain on cash, a company may purchase its own stock for several reasons:

- 1. It may want stock to distribute to employees through stock option plans.
- 2. It may be trying to maintain a favorable market for its stock.
- 3. It may want to increase its earnings per share or stock price per share.
- 4. It may want to have additional shares of stock available for such activities as purchasing other companies.
- 5. It may want to prevent a hostile takeover.

A treasury stock purchase reduces the assets and stockholders' equity of the company. It is not considered a purchase of assets, as the purchase of shares in another company would be. Treasury stock is capital stock that has been issued but is no longer outstanding. Treasury shares can be held for an indefinite period of time, reissued, or retired. Like unissued stock, treasury stock has no rights until it is reissued. Treasury stock does not have voting rights, rights to cash dividends and stock dividends, or rights to share in assets during liquidation of the company, and it is not considered to be outstanding in the calculation of book value. However, there is one major difference between unissued shares and treasury shares: A share of stock that originally was issued at par value or greater and fully paid for, and that then was reacquired as treasury stock, can be reissued at less than par value without negative consequences.

PURCHASE OF TREASURY STOCK When treasury stock is purchased, it is normally recorded at cost. The transaction reduces both the assets and the stockholders' equity of the firm. For example, assume that on September 15 the Caprock Corporation purchases 1,000 shares of its common stock on the market at a price of \$50 per share. The purchase would be recorded as follows:

A = L + OE	Sept. 15	Treasury Stock, Common	50,000	
— —		Cash		50,000
		Acquired 1,000 shares of the company's common stock for \$50 per share		

The treasury shares are recorded at cost. The par value, stated value, or original issue price of the stock is ignored.

The stockholders' equity section of Caprock's balance sheet shows the cost of the treasury stock as a deduction from the total of contributed capital and retained earnings:

Contributed Capital	
Common Stock, \$5 par value, 100,000 shares authorized, 30,000 shares issued, 29,000 shares outstanding	\$ 150,000
Paid-in Capital in Excess of Par Value, Common	30,000
Total Contributed Capital	\$ 180,000
Retained Earnings	900,000
Total Contributed Capital and Retained Earnings	\$1,080,000
Less Treasury Stock, Common (1,000 shares at cost)	50,000
Total Stockholders' Equity	\$1,030,000

Notice that the number of shares issued, and therefore the legal capital, has not changed, although the number of outstanding shares has decreased as a result of the transaction.

SALE OF TREASURY STOCK Treasury shares can be sold at cost, above cost, or below cost. For example, assume that on November 15 the 1,000 treasury shares of the Caprock Corporation are sold for \$50 per share. The following entry records the transaction:

A = L + OE	Nov. 15	Cash	50,000	
+ +		Treasury Stock, Common		50,000
		Reissued 1,000 shares of treasury stock for \$50 per share		

When treasury shares are sold for an amount greater than their cost, the excess of the sales price over cost should be credited to Paid-in Capital, Treasury Stock. No gain should be recorded. For example, suppose that on November 15 the 1,000 treasury shares of the Caprock Corporation are sold for \$60 per share. The entry for the reissue would be as follows:




A = L + OE	Nov. 15	Cash	60,000	
+ +		Treasury Stock, Common		50,000
 + +		Paid-in Capital, Treasury Stock		10,000
		Sold 1,000 shares of treasury stock for \$60 per share; cost was \$50 per share		

If treasury shares are sold below their cost, the difference is deducted from Paid-in Capital, Treasury Stock. When this account does not exist or its balance is insufficient to cover the excess of cost over the reissue price, Retained Earnings absorbs the excess. No loss is recorded. For example, suppose that on September 15, the Caprock Corporation bought 1,000 shares of its common stock on the market at a price of \$50 per share. The company sold 400 shares of its stock on October 15 for \$60 per share and the remaining 600 shares on December 15 for \$42 per share. The entries for these transactions are as follows:


A = L + OE	Sept. 15	Treasury Stock, Common	50,000	
- -		Cash		50,000
		Purchased 1,000 shares of treasury stock at \$50 per share		
A = L + OE	Oct. 15	Cash	24,000	
+ +		Treasury Stock, Common		20,000
 + +		Paid-in Capital, Treasury Stock		4,000
		Sold 400 shares of treasury stock for \$60 per share; cost was \$50 per share		
A = L + OE	Dec. 15	Cash	25,200	
+ -		Paid-in Capital, Treasury Stock	4,000	
 - +		Retained Earnings	800	
		Treasury Stock, Common		30,000
		Sold 600 shares of treasury stock for \$42 per share; cost was \$50 per share		

In the entry for the December 15 transaction, Retained Earnings is debited for \$800 because the 600 shares were sold for \$4,800 less than cost. That amount is \$800 greater than the \$4,000 of paid-in capital generated by the sale of the 400 shares of treasury stock on October 15.

FOCUS ON BUSINESS PRACTICE

In recent years, there has been a surge in stock buybacks resulting in higher return on equity and stock prices.  Coca-Cola,  IBM, Philip Morris, and  McDonald's are recent examples of companies with consistently large buyback policies. In the past three years, for instance, Coca-Cola repurchased shares valued at \$2.8 billion,⁹ and IBM bought

back more than \$19 billion of its stock. These actions improved the companies' earnings per share and return on equity.

Although these buybacks help boost stock prices,  some companies, like Champion International, Owens-Corning, Monsanto, and Eaton, are resisting pressures to buy back shares. These companies believe that if, instead of buying back shares, they invest that cash in their existing operations, returns for stockholders will be even better.¹⁰

RETIREMENT OF TREASURY STOCK

If a company determines that it will not reissue stock it has purchased, with the approval of its stockholders it can retire the stock. When shares of stock are retired, all items related to those shares are removed from the related capital accounts. When treasury stock whose acquisition price is less than the original contributed capital is retired, the difference is recognized in Paid-in Capital, Retirement of Stock. However, when the acquisition price is more than was received when the stock was first issued, the difference is a reduction in stockholders' equity and is debited to Retained Earnings. For instance, suppose that instead of selling the 1,000 shares of treasury stock it purchased for \$50,000, Caprock decides to retire the shares on November 15. Assuming that the \$5 par value common stock was originally issued at \$6 per share, this entry records the retirement:

A = L + OE	Nov. 15	Common Stock	5,000	
-		Paid-in Capital in Excess of		
-		Par Value, Common	1,000	
-		Retained Earnings	44,000	
+		Treasury Stock, Common		50,000
		Retired 1,000 shares that		
		cost \$50 per share and were		
		issued originally at \$6 per share		

Exercising Stock Options

OBJECTIVE

8 Account for the exercise of stock options

More than 98 percent of public companies encourage the ownership of their common stock through a **stock option plan**, which is an agreement to issue stock to employees according to specified terms.¹¹ Under some plans, the option to purchase stock applies to all employees equally, and the stock is purchased at a price close to its market value at the time of purchase. In such situations, the stock issue is recorded in the same way as a stock issue to an outsider. If, for example, we assume that on March 30 the employees of a company purchased 2,000 shares of \$10 par value common stock at the current market value of \$25 per share, the entry would be as follows:

A = L + OE	Mar. 30	Cash	50,000	
+	+	Common Stock		20,000
+	+	Paid-in Capital in Excess of Par Value, Common		30,000
		Issued 2,000 shares of \$10 par value common stock under employee stock option plan		

In other cases, the stock option plan gives employees the right to purchase stock in the future at a fixed price. This type of plan, which is usually offered only to management personnel, both compensates and motivates management because the market value of a company's stock is tied to the company's performance. As the market value of the stock goes up, the difference between the option price and the market price grows, which increases management's compensation. On the date stock options are granted, the fair value of the options must be estimated and the amount in excess of the exercise price must be either recorded as compensation expense over the grant period or reported in the notes to the financial statements.¹² If a company chooses to record compensation expense, additional paid-in capital will increase as a result. Almost all companies report the excess of fair value over exercise price in the notes to the financial statements. The notes must include the impact on net income and earnings per share of not recording compensation expense.

If note disclosure is the preferred method of reporting compensation costs, then when an option eventually is exercised and the stock is issued, the entry is similar to the one above. For example, assume that on July 1, 20x1, a company grants its key management personnel the option to purchase 50,000 shares of \$10 par value common stock at its then-current market value of \$15 per share. Suppose that one of the firm's vice presidents exercises the option to purchase 2,000 shares on March 30, 20x2, when the market price is \$25 per share. The following entry would record the issue:

	20x2			
A = L + OE	Mar. 30	Cash	30,000	
+	+	Common Stock		20,000
+	+	Paid-in Capital in Excess of Par Value, Common		10,000
		Issued 2,000 shares of \$10 par value common stock under the employee stock option plan		

FOCUS ON BUSINESS PRACTICE

Stock options have an earnings advantage for corporations that use them, and their impact varies depending on the size of a company's options program and its industry. Specifically, the cost of options and its effect on earnings may be reported in the notes and not in the income statement as compensation expense. However, salaries and other cash bonuses are included

as compensation expense and reported on the income statement. A recent study by Bears Sterns indicates that options grants would completely wipe out corporate profits and operating income at some fast growing high-tech companies, which tend to rely heavily on generous options grants to attract top talent. The effect for the high-tech industry ranged from 10 to 100 percent. However, the impact of options costs for industrial companies was much less, an average of 3 percent, because they do not have large options programs and the earnings of these firms was quite large.¹³

Although the vice president has a gain of \$20,000 (the \$50,000 market value less the \$30,000 option price), no compensation expense is recorded. Estimation of the fair value of options at the grant date is the subject of more advanced courses. Information pertaining to employee stock option plans should be discussed in the notes to the financial statements.*

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

- 1. Identify and explain the management issues related to contributed capital.** The management of contributed capital is a critical component in the financing of a corporation, which is a legal entity separate and distinct from its owners. The issues faced by management in the area of contributed capital are forming a corporation, managing under the corporate form of business, using equity financing, determining dividend policies, and evaluating performance using return on equity.
- 2. Define start-up and organization costs and state their effects on financial reporting.** The costs of organizing a corporation are recorded as expenses when they are incurred. They increase the initial loss or reduce the initial income of a corporation.
- 3. Identify the components of stockholders' equity.** Stockholders' equity consists of contributed capital and retained earnings. Contributed capital includes two basic types of stock: common stock and preferred stock. When only one type of security is issued, it is common stock. Common stockholders have voting rights; they also share in the earnings of the corporation.
Retained earnings, the other component of stockholders' equity, represents the claim of stockholders to the assets of the company resulting from profitable operations. These are earnings that have been invested in the corporation.
- 4. Account for cash dividends.** The liability for payment of cash dividends arises on the date of declaration by the board of directors. The declaration is recorded with a debit to Cash Dividends Declared and a credit to Cash Dividends Payable. The date of record, on which no entry is required, establishes the stockholders who will receive the cash dividend on the date of payment. Payment is recorded with a debit to Cash Dividends Payable and a credit to Cash.
- 5. Identify the characteristics of preferred stock, including the effect on distribution of dividends.** Preferred stock, like common stock, is sold to raise capital. But the investors in preferred stock have different objectives. To attract such investors, corporations usually give them a preference—in terms of

*Stock options are discussed here in the context of employee compensation. They can also be important features of complex corporate capitalization arrangements.

receiving dividends and assets—over common stockholders. The dividend on preferred stock is generally figured first; then the remainder goes to common stock. If the preferred stock is cumulative and in arrears, the amount in arrears must be allocated to preferred stockholders before any allocation is made to common stockholders. In addition, certain preferred stock is convertible. Preferred stock is often callable at the option of the corporation.

6. Account for the issuance of stock for cash and other assets. A corporation's stock is normally issued for cash and other assets. The majority of states require that stock be issued at a minimum value called *legal capital*. Legal capital is represented by the par or stated value of the stock.

When stock is issued for cash at par or stated value, Cash is debited and Common Stock or Preferred Stock is credited. When stock is sold at an amount greater than par or stated value, the excess is recorded in Paid-in Capital in Excess of Par or Stated Value.

Sometimes stock is issued for noncash assets. Then the accountant must decide how to value the stock. The general rule is to record the stock at its market value. If this value cannot be determined, the fair market value of the asset received is used to record the transaction.

7. Account for treasury stock. Treasury stock is stock that a company has issued and later reacquired but not resold or retired. A company may acquire its own stock to create stock option plans, maintain a favorable market for the stock, increase earnings per share, or purchase other companies. Treasury stock is similar to unissued stock in that it does not have rights until it is reissued. However, treasury stock can be resold at less than par value without penalty. The accounting treatment for treasury stock is as shown below.

Treasury Stock Transaction	Accounting Treatment
Purchase of treasury stock	Debit Treasury Stock and credit Cash for the cost of the shares.
Sale of treasury stock at the same price as the cost of the shares	Debit Cash and credit Treasury Stock for the cost of the shares.
Sale of treasury stock at an amount greater than the cost of the shares	Debit Cash for the reissue price of the shares, and credit Treasury Stock for the cost of the shares and Paid-in Capital, Treasury Stock for the excess.
Sale of treasury stock at an amount less than the cost of the shares	Debit Cash for the reissue price; debit Paid-in Capital, Treasury Stock for the difference between the reissue price and the cost of the shares; and credit Treasury Stock for the cost of the shares. If Paid-in Capital, Treasury Stock does not exist or its balance is not large enough to cover the difference, Retained Earnings should absorb the difference.

8. Account for the exercise of stock options. Companywide stock option plans are used to encourage employees to own a part of the company. Other plans are offered only to management personnel, both to compensate and to motivate them. Usually, the issue of stock to employees under stock option plans is recorded like the issue of stock to any outsider.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- L0 1 Articles of incorporation:** An official document filed with and approved by a state that authorizes the incorporators to do business as a corporation.
- L0 1 Audit committee:** A subgroup of the board of directors of a corporation charged with ensuring that the board will be objective in reviewing management's performance; it engages the company's independent auditors and reviews their work.
- L0 1 Authorized stock:** The maximum number of shares a corporation can issue without changing its charter with the state.
- L0 5 Callable preferred stock:** Preferred stock that can be redeemed or retired at a stated price at the option of the corporation.
- L0 3 Common stock:** Shares of stock that carry voting rights but that rank below preferred stock in terms of dividends and the distribution of assets.
- L0 5 Convertible preferred stock:** Preferred stock that can be exchanged for common stock at the option of the holder.
- L0 1 Corporation:** A separate legal entity having its own rights, privileges, and liabilities distinct from those of its owners.
- L0 5 Cumulative preferred stock:** Preferred stock on which unpaid dividends accumulate over time and must be satisfied in any given year before a dividend can be paid to common stockholders.
- L0 4 Date of declaration:** The date on which the board of directors declares a dividend.
- L0 4 Date of payment:** The date on which payment of a dividend is made.
- L0 4 Date of record:** The date on which ownership of stock for the purpose of receiving a dividend is determined.
- L0 1 Dividend:** The distribution of a corporation's assets (usually cash generated by past earnings) to its stockholders.
- L0 5 Dividends in arrears:** Past dividends on cumulative preferred stock that remain unpaid.
- L0 1 Dividends yield:** Current return to stockholders in the form of dividends; dividends per share divided by market price per share.
- L0 1 Double taxation:** The act of taxing corporate earnings twice—once as the income of the corporation and once as the dividends distributed to stockholders.
- L0 4 Ex-dividend:** A description of capital stock between the date of record and the date of payment, when the right to a dividend already declared on the stock remains with the person who sells the stock and does not transfer to the person who buys it.
- L0 1 Initial public offering (IPO):** Common stock issue of a company that is selling its stock to the public for the first time.
- L0 3 Issued stock:** The shares of stock sold or otherwise transferred to stockholders.
- L0 1 Legal capital:** The number of shares of stock issued times the par value; the minimum amount that can be reported as contributed capital.
- L0 4 Liquidating dividend:** A dividend that exceeds retained earnings; usually paid when a corporation goes out of business or reduces its operations.
- L0 5 Noncumulative preferred stock:** Preferred stock that does not oblige the issuer to make up a missed dividend in a subsequent year before paying dividends to common stockholders.
- L0 6 No-par stock:** Capital stock that does not have a par value.
- L0 3 Outstanding stock:** Stock that has been issued and is still in circulation.
- L0 1 Par value:** An arbitrary amount assigned to each share of stock; used to determine the legal capital of a corporation.

- L05 Preferred stock:** Stock that has preference over common stock, usually in terms of dividends and the distribution of assets.
- L01 Price/earnings (P/E) ratio:** A measure of confidence in a company's future; market price per share divided by earnings per share.
- L03 Residual equity:** The common stock of a corporation.
- L01 Return on equity:** A measure of management performance; net income divided by average stockholders' equity.
- L01 Share of stock:** A unit of ownership in a corporation.
- L02 Start-up and organization costs:** The costs of forming a corporation.
- L06 Stated value:** A value assigned by the board of directors of a corporation to no-par stock.
- L01 Stock certificate:** A document issued to a stockholder indicating the number of shares of stock the stockholder owns.
- L08 Stock option plan:** An agreement to issue stock to employees according to specified terms.
- L07 Treasury stock:** Capital stock, either common or preferred, that has been issued and reacquired by the issuing company but that has not subsequently been resold or retired.
- L01 Underwriter:** An intermediary between the corporation and the investing public who facilitates an issue of stock or other securities for a fee.

REVIEW PROBLEM

- L01**
- L02**
- L03**
- L04**
- L05**
- L06**
- L07**

Stock Journal Entries and Stockholders' Equity

The Beta Corporation was organized in 20x1 in the state of Arizona. Its charter authorized the corporation to issue 1,000,000 shares of \$1 par value common stock and an additional 25,000 shares of 4 percent, \$20 par value cumulative convertible preferred stock. Here are the transactions that related to the company's stock during 20x1:

- Feb. 1 Issued 100,000 shares of common stock for \$125,000.
- 15 Issued 3,000 shares of common stock for accounting and legal services. The services were billed to the company at \$3,600.
- Mar. 15 Issued 120,000 shares of common stock to Edward Jackson in exchange for a building and land that had appraised values of \$100,000 and \$25,000, respectively.
- Apr. 2 Purchased 20,000 shares of common stock for the treasury at \$1.25 per share from a person who changed his mind about investing in the company.
- July 1 Issued 25,000 shares of preferred stock for \$500,000.
- Sept. 30 Sold 10,000 of the shares in the treasury for \$1.50 per share.
- Dec. 31 The board declared dividends of \$24,910 payable on January 15 to stockholders of record on January 8. Dividends included preferred stock cash dividends for one-half year.

For the period ended December 31, 20x1, the company reported net income of \$40,000 and earnings per common share of \$.14. At December 31, the market price per common share was \$1.60.

REQUIRED

1. Record these transactions in journal form. Following the December 31 entry to record dividends, show dividends payable for each class of stock.
2. Prepare the stockholders' equity section of the Beta Corporation balance sheet as of December 31, 20x1. (*Hint:* Use net income and dividends to calculate retained earnings.)
3. Calculate dividends yield on common stock, price/earnings ratio of common stock, and return on equity.

ANSWER TO REVIEW PROBLEM

1. Prepare the entries in journal form.

20x1

Feb.	1	Cash	125,000	
		Common Stock		100,000
		Paid-in Capital in Excess of Par Value, Common		25,000
		Issued 100,000 shares of \$1 par value common stock for \$1.25 per share		
	15	Start-up and Organization Expense	3,600	
		Common Stock		3,000
		Paid-in Capital in Excess of Par Value, Common		600
		Issued 3,000 shares of \$1 par value common stock for billed accounting and legal services of \$3,600		
Mar.	15	Building	100,000	
		Land	25,000	
		Common Stock		120,000
		Paid-in Capital in Excess of Par Value, Common		5,000
		Issued 120,000 shares of \$1 par value common stock for a building and land appraised at \$100,000 and \$25,000, respectively		
Apr.	2	Treasury Stock, Common	25,000	
		Cash		25,000
		Purchased 20,000 shares of common stock for the treasury at \$1.25 per share		
July	1	Cash	500,000	
		Preferred Stock		500,000
		Issued 25,000 shares of \$20 par value preferred stock for \$20 per share		
Sept.	30	Cash	15,000	
		Treasury Stock, Common		12,500
		Paid-in Capital, Treasury Stock		2,500
		Sold 10,000 shares of treasury stock at \$1.50 per share; original cost was \$1.25 per share		
Dec.	31	Cash Dividends Declared	24,910	
		Cash Dividends Payable		24,910
		Declared a \$24,910 cash dividend to preferred and common stockholders		
		Total dividend	24,910	
		Less preferred stock cash dividend		
		$\$500,000 \times .04 \times 6/12$	10,000	
		Common stock cash dividend	<u>14,910</u>	

2. Prepare the stockholders' equity section of the balance sheet.

Beta Corporation Balance Sheet December 31, 20x1			
Stockholders' Equity			
Contributed Capital			
Preferred Stock, 4 percent cumulative convertible, \$20 par value, 25,000 shares authorized, issued, and outstanding			\$500,000
Common Stock, \$1 par value, 1,000,000 shares authorized, 223,000 shares issued, and 213,000 shares outstanding	\$223,000		
Paid-in Capital in Excess of Par Value, Common	30,600		
Paid-in Capital, Treasury Stock	2,500		256,100
Total Contributed Capital			\$756,100
Retained Earnings			15,090*
Total Contributed Capital and Retained Earnings			\$771,190
Less Treasury Stock, Common (10,000 shares, at cost)			12,500
Total Stockholders' Equity			<u>\$758,690</u>

*Retained Earnings = \$40,000 - \$24,910 = \$15,090.

3. Calculate dividends yield on common stock, price/earnings ratio of common stock, and return on equity.

$$\text{Dividends per Share} = \frac{\$14,910 \text{ Common Stock Dividend}}{\div 213,000 \text{ Common Shares Outstanding}} = \$0.07$$

$$\text{Dividends Yield} = \frac{\text{Dividends per Share}}{\text{Market Price per Share}} = \frac{\$0.07}{\$1.60} = 4.4\%$$

$$\text{Price/Earnings (P/E) Ratio} = \frac{\text{Market Price per Share}}{\text{Earnings per Share}} = \frac{\$1.60}{\$0.15} = 10.7 \text{ times}$$

The opening balance of stockholders' equity on February 1, 20x1, was \$125,000.

$$\begin{aligned} \text{Return on Equity} &= \frac{\text{Net Income}}{\text{Average Stockholders' Equity}} \\ &= \frac{\$40,000}{(\$758,690 + \$125,000) \div 2} \\ &= 9.1\% \end{aligned}$$

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. What issues faced by management are related to contributed capital?
2. Identify and explain several advantages of the corporate form of business.

3. Identify and explain several disadvantages of the corporate form of business.
4. What is dividends yield, and what do investors learn from it?
5. What is the price/earnings (P/E) ratio, and what does it measure?
6. What are the start-up and organization costs of a corporation?
7. What is the proper accounting treatment of start-up and organization costs?
8. What is the legal capital of a corporation, and what is its significance?
9. Describe the significance of the following dates as they relate to dividends: (a) date of declaration, (b) date of record, and (c) date of payment.
10. Explain the accounting treatment of cash dividends.
11. What are dividends in arrears, and how should they be disclosed in the financial statements?
12. Define the terms *cumulative*, *convertible*, and *callable* as they apply to preferred stock.
13. How is the value of stock determined when stock is issued for noncash assets?
14. Define *treasury stock* and explain why a company would purchase its own stock.
15. What is the proper classification of the following accounts on the balance sheet? Indicate whether stockholders' equity accounts are contributed capital, retained earnings, or contra stockholders' equity. (a) Common Stock; (b) Treasury Stock; (c) Paid-in Capital, Treasury Stock; (d) Paid-in Capital in Excess of Par Value, Common; (e) Paid-in Capital in Excess of Stated Value, Common; and (f) Retained Earnings.
16. What is a stock option plan and why would a company have one?

SHORT EXERCISES

LO 1 Management Issues

- SE 1.** Indicate whether each of the actions below is related to (a) forming a corporation, (b) managing under the corporate form of business, (c) using equity financing, (d) determining dividend policies, or (e) evaluating performance using return on equity.
1. Considering whether to make a distribution to stockholders
 2. Controlling day-to-day operations not necessarily by the owners
 3. Determining whether to issue preferred or common stock
 4. Compensating management based on the company's meeting or exceeding the targeted return on equity
 5. Issuing shares (not to exceed the maximum of authorized shares)
 6. Transferring shares from one owner to another without the approval of other owners
 7. Deciding who will be the officers and board of directors

LO 1 Advantages and Disadvantages of a Corporation

- SE 2.** Identify whether each of the following characteristics is an advantage or a disadvantage of the corporate form of business:
1. Ease of transfer of ownership
 2. Taxation
 3. Separate legal entity
 4. Lack of mutual agency
 5. Government regulation
 6. Continuous existence

LO 2 Effect of Start-up and Organization Costs

- SE 3.** At the beginning of 20x1, Matson Company incurred two start-up and organization costs: (1) attorneys' fees with a market value of \$5,000, paid with 3,000 shares of \$1 par value common stock, and (2) incorporation fees paid to the state of \$3,000. Calculate total start-up and organization costs. What will be the effect of these costs on the balance sheet and income statement?

LO 3 Stockholders' Equity

- SE 4.** Prepare the stockholders' equity section of Lincoln Corporation's balance sheet from the following accounts and balances on December 31, 20xx.

Account	Balance	
	Debit	Credit
Common Stock, \$10 par value, 60,000 shares authorized, 40,000 shares issued, and 39,000 shares outstanding		\$400,000
Paid-in Capital in Excess of Par Value, Common		200,000
Retained Earnings		30,000
Treasury Stock, Common (1,000 shares, at cost)	\$15,000	

LO 4 Cash Dividends

- SE 5.** Blancone Corporation has authorized 100,000 shares of \$1 par value common stock, of which 80,000 are issued and 70,000 are outstanding. On May 15, the board of directors declared a cash dividend of \$.10 per share payable on June 15 to stockholders of record on June 1. Prepare the entries, as necessary, for each of the three dates.

LO 5 Preferred Stock Dividends with Dividends in Arrears

- SE 6.** The Vergennes Corporation has 1,000 shares of its \$100, 8 percent cumulative preferred stock outstanding and 20,000 shares of its \$1 par value common stock outstanding. In its first three years of operation, the board of directors of Vergennes Corporation paid cash dividends as follows: 20x1, none; 20x2, \$20,000; and 20x3, \$40,000.
Determine the total cash dividends and dividends per share paid to the preferred and common stockholders during each of the three years.

LO 6 Issuance of Stock

- SE 7.** Ferrisburg Company is authorized to issue 100,000 shares of common stock. The company sold 5,000 shares at \$12 per share. Prepare journal entries to record the sale of stock for cash under each of the following independent alternatives: (1) The stock has a par value of \$5, and (2) the stock has no par value but a stated value of \$1 per share.

LO 6 Issuance of Stock for Noncash Assets

- SE 8.** Borneo Corporation issued 8,000 shares of its \$1 par value common stock in exchange for land that had a fair market value of \$50,000. Prepare the journal entries necessary to record the issuance of the stock for the land under each of these conditions: (1) The stock was selling for \$7 per share on the day of the transaction; (2) management attempted to place a value on the common stock but could not do so.

LO 7 Treasury Stock Transactions

- SE 9.** Prepare the journal entries necessary to record the following stock transactions of the Lemner Company during 20xx:
- Oct. 1 Purchased 1,000 shares of its own \$2 par value common stock for \$20 per share, the current market price.
 17 Sold 250 shares of treasury stock purchased on October 1 for \$25 per share.
 21 Sold 400 shares of treasury stock purchased on October 1 for \$18 per share.

LO 7 Retirement of Treasury Stock

- SE 10.** On October 28, 20xx, the Lemner Company (SE 9) retired the remaining 350 shares of treasury stock. The shares were originally issued at \$5 per share. Prepare the necessary journal entry.

LO 8 Exercise of Stock Options

- SE 11.** On June 6, Winston Leno exercised his option to purchase 10,000 shares of Plunkett Company \$1 par value common stock at an option price of \$4. The market price per share was \$4 on the grant date and \$18 on the exercise date. Record the transaction on Plunkett's books.

EXERCISES

LO 1 Dividends Yield and Price/Earnings Ratio

- E 1.** In 20x1, Caps Corporation earned \$2.20 per share and paid a dividend of \$1.00 per share. At year end, the price of its stock was \$33 per share. Calculate the dividends yield and the price/earnings ratio.

**LO 3 Stockholders' Equity
LO 7**

- E 2.** The accounts and balances below were taken from the records of Hagor Corporation on December 31, 20xx.

Account	Balance	
	Debit	Credit
Preferred Stock, \$100 par value, 9 percent cumulative, 20,000 shares authorized, 12,000 shares issued and outstanding		\$1,200,000
Common Stock, \$12 par value, 90,000 shares authorized, 60,000 shares issued, and 57,000 shares outstanding		720,000
Paid-in Capital in Excess of Par Value, Common		388,000
Retained Earnings		46,000
Treasury Stock, Common (3,000 shares, at cost)	\$60,000	

Prepare a stockholders' equity section for Hagor Corporation's balance sheet.

**LO 3 Characteristics of
LO 5 Common and Preferred
Stock**

- E 3.** Indicate whether each characteristic listed below is more closely associated with common stock (C) or preferred stock (P).

- Often receives dividends at a set rate
- Is considered the residual equity of a company
- Can be callable
- Can be convertible
- More likely to have dividends that vary in amount from year to year
- Can be entitled to receive dividends not paid in past years
- Likely to have full voting rights
- Receives assets first in liquidation
- Generally receives dividends before other classes of stock

**LO 3 Stock Journal Entries and
LO 6 Stockholders' Equity**

- E 4.** The Prada Hospital Supply Corporation was organized in 20xx. The company was authorized to issue 100,000 shares of no-par common stock with a stated value of \$5 per share, and 20,000 shares of \$100 par value, 6 percent noncumulative preferred stock.

On March 1 the company issued 60,000 shares of its common stock for \$15 per share and 8,000 shares of its preferred stock for \$100 per share.

- Prepare the journal entries to record the issuance of the stock.
- Prepare the company's stockholders' equity section of the balance sheet immediately after the common and preferred stock was issued.

LO 4 Cash Dividends

- E 5.** Cardoso Corporation has secured authorization from the state for 200,000 shares of \$10 par value common stock. There are 160,000 shares issued and 140,000 shares outstanding. On June 5, the board of directors declared a \$.50 per share cash dividend to be paid on June 25 to stockholders of record on June 15. Prepare the journal entries necessary to record these events.

**LO 4 Cash Dividends
LO 7**

- E 6.** Bodi Corporation has 500,000 authorized shares of \$1 par value common stock, of which 400,000 are issued, including 40,000 shares of treasury stock. On October 15, the board of directors declared a cash dividend of \$.25 per share payable on November 15 to stockholders of record on November 1. Prepare the entries, as necessary, for each of the three dates.

LO 5 Cash Dividends with Dividends in Arrears

- E 7.** The Hachiya Corporation has 10,000 shares of its \$100 par value, 7 percent cumulative preferred stock outstanding, and 50,000 shares of its \$1 par value common stock outstanding. In its first four years of operation, the board of directors of Hachiya Corporation paid cash dividends as follows: 20x1, none; 20x2, \$120,000; 20x3, \$140,000; 20x4, \$140,000.

Determine the dividends per share and total cash dividends paid to the preferred and common stockholders during each of the four years.

LO 5 Preferred and Common Cash Dividends

- E 8.** The McCay Corporation pays dividends at the end of each year. The dividends paid for 20x1, 20x2, and 20x3 were \$80,000, \$60,000, and \$180,000, respectively.

Calculate the total amount of dividends paid each year to the common and preferred stockholders if each of the following capital structures is assumed: (1) 20,000 shares of \$100 par, 6 percent noncumulative preferred stock and 60,000 shares of \$10 par common stock. (2) 10,000 shares of \$100 par, 7 percent cumulative preferred stock and 60,000 shares of \$10 par common stock. There were no dividends in arrears at the beginning of 20x1.

LO 6 Issuance of Stock

- E 9.** Seong Company is authorized to issue 200,000 shares of common stock. On August 1, the company issued 10,000 shares at \$25 per share. Prepare journal entries to record the issuance of stock for cash under each of the following independent alternatives:

1. The stock has a par value of \$25.
2. The stock has a par value of \$10.
3. The stock has no par value.
4. The stock has a stated value of \$1 per share.

LO 6 Issuance of Stock for Noncash Assets

- E 10.** On July 1, 20xx, Whitesides, a new corporation, issued 20,000 shares of its common stock for a corporate headquarters building. The building has a fair market value of \$600,000 and a book value of \$400,000. Because the corporation is new, it is not possible to establish a market value for the common stock.

Record the issuance of stock for the building, assuming the following conditions: (1) the par value of the stock is \$10 per share; (2) the stock is no-par stock; and (3) the stock has a stated value of \$4 per share.

LO 7 Treasury Stock Transactions

- E 11.** Prepare the necessary journal entries for the Skoglund Company to record the following stock transactions, representing all of the company's treasury stock transactions, during 20xx:

- May 5 Purchased 400 shares of its own \$2 par value common stock for \$20 per share, the current market price.
- 17 Sold 150 shares of treasury stock purchased on May 5 for \$22 per share.
- 21 Sold 100 shares of treasury stock purchased on May 5 for \$20 per share.
- 28 Sold the remaining 150 shares of treasury stock purchased on May 5 for \$19 per share.

LO 7 Treasury Stock Transactions Including Retirement

- E 12.** Prepare the journal entries necessary to record the following stock transactions of Vazquez Corporation, which represent all of its treasury stock transactions.

- June 1 Purchased 2,000 shares of its own \$30 par value common stock for \$70 per share, the current market price.
- 10 Sold 500 shares of treasury stock purchased on June 1 for \$80 per share.
- 20 Sold 700 shares of treasury stock purchased on June 1 for \$58 per share.
- 30 Retired the remaining shares purchased on June 1. The original issue price was \$42 per share.

LO 8 Grant and Exercise of Stock Options

- E 13.** On January 1, 20x3, Ho-Young Wang received an option to purchase 10,000 shares of \$1 par value common stock at the January 1, 20x3, market price of \$13 per share. The fair market value of the options on the date of grant was \$16 per share, and the options expire on December 31, 20x3. Record the entry to recognize compensation expense for 20x3 and describe the alternative method of reporting in the notes to the financial statements. Ho-Young Wang exercised her options on November 30, 20x3. Record the issuance of stock.

LO 2 Start-up and
LO 3 Organization Costs,
LO 4 Stock and Dividend
LO 6 Journal Entries, and
 Stockholders' Equity



REQUIRED

LO 1 Preferred and Common
LO 5 Stock Dividends and
 Dividends Yield



REQUIRED

LO 7 Treasury Stock Transactions



REQUIRED

LO 2 Comprehensive
LO 3 Stockholders' Equity
LO 4 Transactions



PROBLEMS

- P 1.** Sussex Corporation began operations on September 1, 20xx. The corporation's charter authorized 300,000 shares of \$8 par value common stock. Sussex Corporation engaged in the following transactions during its first quarter:

Sept. 1 Issued 50,000 shares of common stock, \$500,000.
 1 Paid an attorney \$32,000 to help start up and organize the corporation and obtain the corporate charter from the state.
 Oct. 2 Issued 80,000 shares of common stock, \$960,000.
 Nov. 30 The board of directors declared a cash dividend of \$.40 per share to be paid on December 15 to stockholders of record on December 10.

1. Prepare journal entries to record the first-quarter transactions shown above.
2. Prepare the stockholders' equity section of Sussex Corporation's November 30, 20xx, balance sheet. Net income for the quarter was \$80,000.

- P 2.** The DeMeo Corporation had both common stock and preferred stock outstanding from 20x2 through 20x4. Information about each stock for the three years is as follows:

Type	Par Value	Shares Outstanding	Other
Preferred	\$100	40,000	7% cumulative
Common	20	600,000	

The company paid \$140,000, \$800,000, and \$1,100,000 in dividends for 20x2 through 20x4, respectively. The market price per common share was \$15 and \$17 per share at year end 20x3 and 20x4, respectively.

1. Determine the dividends per share and total dividends paid to the common and preferred stockholders each year.
2. Repeat the computations performed in 1, with the assumption that the preferred stock was noncumulative.
3. Calculate the 20x3 and 20x4 dividends yield for common stock using dividends per share computed in 2.

- P 3.** The Spivy Corporation was involved in the following treasury stock transactions during 20x1:

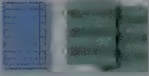
- a. Purchased 80,000 shares of its \$1 par value common stock at \$2.50 per share.
- b. Purchased 16,000 shares of its common stock at \$2.80 per share.
- c. Sold 44,000 shares purchased in a for \$131,000.
- d. Sold the other 36,000 shares purchased in a for \$72,000.
- e. Sold 6,000 of the remaining shares of treasury stock for \$1.60 per share.
- f. Retired all the remaining shares of treasury stock. All shares originally were issued at \$1.50 per share.

Record the treasury stock transactions in journal form.

- P 4.** Kokaly Plastics Corporation was chartered in the state of Massachusetts. The company was authorized to issue 20,000 shares of \$100 par value, 6 percent preferred stock and 100,000 shares of no-par common stock. The common stock has a \$2 stated value. The stock-related transactions for the quarter ended October 31, 20xx, were as follows:

- Aug. 3 Issued 10,000 shares of common stock for \$120,000 worth of services rendered in organizing and chartering the corporation.
 15 Issued 16,000 shares of common stock for land, which had an asking price of \$200,000. The common stock had a market value of \$12 per share.
 22 Issued 10,000 shares of preferred stock for \$1,000,000.
 Oct. 4 Issued 10,000 shares of common stock for \$120,000.
 10 Purchased 5,000 shares of common stock for the treasury for \$13,000.
 15 Declared a quarterly cash dividend on the outstanding preferred stock and \$.10 per share on common stock outstanding, payable on October 31 to stockholders of record on October 25.
 25 Date of record for cash dividends.
 31 Paid cash dividends.

REQUIRED

- LO 2 Comprehensive
LO 3 Stockholders' Equity
LO 4 Transactions and
LO 5 T Accounts
LO 6 
LO 7
LO 8

- Record transactions for the quarter ended October 31, 20xx, in journal form.
- Prepare the stockholders' equity section of the company's balance sheet as of October 31, 20xx. Net income for the quarter was \$46,000.

P 5. In January 20xx, the Jones Corporation was organized and authorized to issue 2,000,000 shares of no-par common stock and 50,000 shares of 5 percent, \$50 par value, noncumulative preferred stock. The stock-related transactions for the first year's operations were as follows:

- Jan. 19 Sold 15,000 shares of the common stock for \$31,500. State law requires a minimum of \$1 stated value per share.
21 Issued 5,000 shares of common stock to attorneys and accountants for services valued at \$11,000 and provided during the organization of the corporation.
Feb. 7 Issued 30,000 shares of common stock for a building that had an appraised value of \$78,000.
Mar. 22 Purchased 10,000 shares of common stock for the treasury at \$3 per share.
July 15 Issued 5,000 shares of common stock to employees under a stock option plan that allows any employee to buy shares at the current market price, which today is \$3 per share.
Aug. 1 Sold 2,500 shares of treasury stock for \$4 per share.
Sept. 1 Declared a cash dividend of \$.15 per common share to be paid on September 25 to stockholders of record on September 15.
15 Cash dividends date of record.
25 Paid cash dividends to stockholders of record on September 15.
Oct. 30 Issued 4,000 shares of common stock for a piece of land. The stock was selling for \$3 per share, and the land had a fair market value of \$12,000.
Dec. 15 Issued 2,200 shares of preferred stock for \$50 per share.

REQUIRED

- Record the above transactions in T accounts. Prepare T accounts for Cash; Land; Building; Cash Dividends Payable; Preferred Stock; Common Stock; Paid-in Capital in Excess of Stated Value, Common; Paid-in Capital, Treasury Stock; Retained Earnings; Treasury Stock, Common; Cash Dividends Declared; and Start-up and Organization Expense.
- Prepare the stockholders' equity section of Jones Corporation's balance sheet as of December 31, 20xx. Net income earned during the year was \$100,000.

ALTERNATE PROBLEMS

P 6. On March 1, 20xx, Carmel Corporation began operations with a charter from the state that authorized 100,000 shares of \$4 par value common stock. Over the next quarter, the firm engaged in the following transactions:

- Mar. 1 Issued 30,000 shares of common stock, \$200,000.
2 Paid fees associated with obtaining the charter and starting up and organizing the corporation, \$24,000.
Apr. 10 Issued 13,000 shares of common stock, \$130,000.
May 31 The board of directors declared a \$.20 per share cash dividend to be paid on June 15 to shareholders of record on June 10.

- Record the transactions indicated above in journal form.
- Prepare the stockholders' equity section of Carmel Corporation's balance sheet on May 31, 20xx. Net income earned during the first quarter was \$30,000.

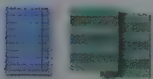
P 7. The Clockwork Corporation had the following stock outstanding from 20x1 through 20x4:

Preferred stock: \$100 par value, 8 percent cumulative, 10,000 shares authorized, issued, and outstanding

Common stock: \$10 par value, 200,000 shares authorized, issued, and outstanding

The company paid \$60,000, \$60,000, \$188,000, and \$260,000 in dividends during 20x1, 20x2, 20x3, and 20x4, respectively. The market price per common share was \$7.25 and \$8.00 per share at year end 20x3 and 20x4, respectively.

- LO 2 Start-up and
LO 3 Organization Costs,
LO 4 Stock and Dividend
LO 6 Journal Entries, and
Stockholders' Equity



REQUIRED

- LO 1 Preferred and Common
LO 5 Stock Dividends and
Dividends Yield



REQUIRED

1. Determine the dividends per share and the total dividends paid to common stockholders and preferred stockholders in 20x1, 20x2, 20x3, and 20x4.
2. Perform the same computations, with the assumption that the preferred stock was noncumulative.
3. Calculate the 20x3 and 20x4 dividends yield for common stock, using the dividends per share computed in 2.

LO 2 Comprehensive
LO 3 Stockholders' Equity
LO 4 Transactions
LO 5
LO 6
LO 7

P 8. Vanowski, Inc., was organized and authorized to issue 10,000 shares of \$100 par value, 9 percent preferred stock and 100,000 shares of no-par, \$5 stated value common stock on July 1, 20xx. Stock-related transactions for Vanowski were as follows:

- July 1 Issued 20,000 shares of common stock at \$11 per share.
 1 Issued 1,000 shares of common stock at \$11 per share for services rendered in connection with the organization of the company.
 2 Issued 2,000 shares of preferred stock at par value for cash.
 10 Issued 5,000 shares of common stock for land on which the asking price was \$70,000. Market value of the stock was \$12. Management wishes to record the land at full market value of the stock.
- Aug. 2 Purchased 3,000 shares of common stock for the treasury at \$13 per share.
 10 Declared a cash dividend for one month on the outstanding preferred stock and \$.02 per share on common stock outstanding, payable on August 22 to stockholders of record on August 12.
 12 Date of record for cash dividends.
 22 Paid cash dividends.

REQUIRED

1. Record the transactions in journal form.
2. Prepare the stockholders' equity section of the balance sheet as it would appear on August 31, 20xx. Net income for July and August was \$25,000.

EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

LO 1 Reasons for Issuing
LO 3 Common Stock



LO 5 Reasons for Issuing
Preferred Stock



- SD 1.** In a recent year, *Safeway, Inc.*, one of the largest grocery chains in the United States, issued 19,750,000 shares of common stock for \$52¹¹/₁₆ for a total of \$1,040,578,125.¹⁴ As a large, profitable company, Safeway could have raised this significant amount of money by issuing long-term bonds. What are some advantages of issuing common stock as opposed to bonds? What are some disadvantages?
- SD 2.** Preferred stock is a hybrid security that has some of the characteristics of stock and some of the characteristics of bonds. Historically, preferred stock has not been a popular means of financing. In the past few years, however, it has become more attractive to companies and individual investors alike, and investors are buying large amounts because of high yields. Large preferred stock issues have been made by banks such as *Chase Manhattan*, *Citibank*, *Republic New York*, and *Wells Fargo*, as well as other companies. The dividends yields on these stocks are over 9 percent, higher than the interest rates on comparable bonds.¹⁵ Especially popular are preferred equity redemption



Cash Flow



CD-ROM



Communication



Critical Thinking



Ethics



General Ledger



Group Activity



Hot Links to Real Companies



International



Internet



Key Ratio



Memo



Spreadsheet

convertible stocks, or PERCs, which are automatically convertible into common stock after three years if the company does not redeem or call them first and retire them. What reasons can you give for the popularity of preferred stock, and of PERCs in particular, when the tax-deductible interest on bonds is less costly? Discuss both the company's and the investor's standpoints.

SD 3.

LO 7 Purposes of Treasury Stock

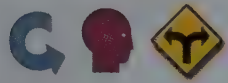


Many companies in recent years have bought back their common stock. For example, *IBM*, with large cash holdings, has spent almost \$27 billion over five years buying back its stock. What are the reasons that companies buy back their own shares? What is the effect of common stock share buybacks on earnings per share, return on equity, return on assets, debt to equity, and the current ratio?

Ethical Dilemma

SD 4.

LO 1 Ethics of Incorporating an Accounting Firm



Traditionally, accounting firms have organized as partnerships or as professional corporations, a form of corporation that in many ways resembles a partnership. In recent years, some accounting firms have had large judgments imposed upon them as a result of lawsuits by investors who lost money when they invested in companies the firms have audited that went bankrupt. Because of the increased risk of large losses from malpractice suits, accounting firms are allowed to incorporate as long as they maintain a minimum level of partners' capital and carry malpractice insurance. Some accounting practitioners feel that incorporating would be a violation of their responsibility to the public. What features of the corporate form of business would be most advantageous to the partners of an accounting firm? Do you think it is a violation of the public trust for an accounting firm to incorporate?

Research Activity

SD 5.

LO 1 Comparison of
LO 3 Stockholders' Equity
LO 4 Characteristics

Select the annual reports of three corporations using either your library or the Fingraph® Financial Analyst™ CD-ROM software that accompanies this text. You can choose them from the same industry or at random, at the direction of your instructor. (Note: You may be asked to use these companies again in the Research Activities in later chapters.) Prepare a table with a column for each corporation. Then answer the following questions for each corporation: Does the corporation have preferred stock? If so, what are the par value and the indicated dividend, and is the preferred stock cumulative or convertible? Is the common stock par value or no-par? What is the par value or stated value? What cash dividends, if any, were paid in the past year? What is the dividends yield? From the notes to the financial statements, determine whether the company has an employee stock option plan. What are some of its provisions? What is the return on equity? Be prepared to discuss the characteristics of the stocks and dividends for your selected companies in class.

Decision-Making Practice

SD 6.

LO 1 Analysis of Alternative
LO 3 Financing Methods

Companies offering services to the computer technology industry are growing quickly. Participating in this growth, *Northeast Servotech Corporation* has expanded rapidly in recent years. Because of its profitability, the company has been able to grow without obtaining external financing. This fact is reflected in its current balance sheet, which contains no long-term debt. The liability and stockholders' equity sections of the balance sheet on March 31, 20xx, are shown at the top of the next page.

The company now has the opportunity to double its size by purchasing the operations of a rival company for \$4,000,000. If the purchase goes through, Northeast Servotech will become the top company in its specialized industry in the northeastern part of the country. The problem for management is how to finance the purchase. After much study and discussion with bankers and underwriters, management has prepared three financing alternatives to present to the board of directors, which must authorize the purchase and the financing.

Alternative A: The company could issue \$4,000,000 of long-term debt. Given the company's financial rating and the current market rates, management believes the company will have to pay an interest rate of 12 percent on the debt.

Northeast Servotech Corporation
Balance Sheet
March 31, 20xx

Liabilities	
Current Liabilities	\$ 500,000
Stockholders' Equity	
Common Stock, \$10 par value, 500,000 shares authorized, 100,000 shares issued and outstanding	\$1,000,000
Paid-in Capital in Excess of Par Value, Common	1,800,000
Retained Earnings	<u>1,700,000</u>
Total Stockholders' Equity	4,500,000
Total Liabilities and Stockholders' Equity	<u>\$5,000,000</u>

Alternative B: The company could issue 40,000 shares of 8 percent, \$100 par value preferred stock.

Alternative C: The company could issue 100,000 additional shares of \$10 par value common stock at \$40 per share.

Management explains to the board that the interest on the long-term debt is tax-deductible and that the applicable income tax rate is 40 percent. The board members know that a dividend of \$.80 per share of common stock was paid last year, up from \$.60 and \$.40 per share in the two years before that. The board has had a policy of regular increases in dividends of \$.20 per share. The board feels that each of the three financing alternatives is feasible and now wants to study the financial effects of each alternative.

1. Prepare a schedule to show how the liabilities and stockholders' equity sections of Northeast Servotech's balance sheet would look under each alternative, and compute the debt to equity ratio (total liabilities ÷ total stockholders' equity) for each.
2. Compute and compare the cash needed to pay the interest or dividends for each kind of new financing net of income taxes in the first year.
3. How might the cash needed to pay for the financing change in future years under each alternative?
4. Prepare a memorandum to the board of directors that evaluates the alternatives in order of preference based on cash flow effects, giving arguments for and against each one.



Group Activity: Assign the alternatives to different groups to analyze and present to the class as the "board of directors."

FINANCIAL REPORTING AND ANALYSIS

Interpreting Financial Reports

- FRA 1.** *Netscape Communications Corporation*, now a part of AOL-Time Warner, is a leading provider of software, applications, and tools that link people and information over networks, the Internet, and the World Wide Web. It is one of the great success stories of the Internet age. Netscape went public with an IPO in June 1995 and issued shares at a price of \$14 per share. On November 14, 1996, Netscape announced a common stock issue in an ad in *The Wall Street Journal*:

LO 1 Effect of Stock Issue

LO 3

LO 6



6,440,000 Shares
NETSCAPE
Common Stock
Price \$53¾ a share

If Netscape sold all these shares at the offering price of \$53.75, the net proceeds before issue costs would be \$346.15 million.

A portion of the stockholders' equity section of the balance sheet adapted from Netscape's 1995 annual report is shown below.

	1995	1994
	(In thousands)	
Common Stock, \$.0001 par value, 200,000,000 shares authorized, 12,003,594 shares in 1994 and 81,063,158 shares in 1995 issued and outstanding	\$ 8	\$ 1
Additional Paid-in Capital	196,749	18,215
Accumulated Deficit	(16,314)	(12,873)

REQUIRED

1. Assume the net proceeds from the sale of 6,440,000 shares at \$53.75 were \$342.6 million after issue costs. Record the stock issuance on Netscape's accounting records in journal form.
2. Prepare the portion of the stockholders' equity section of the balance sheet shown above after the issue of the common stock, based on the information given. Round all answers to the nearest thousand.
3. Based on your answer in 2, did Netscape have to increase its authorized shares to undertake this stock issue?
4. What amount per share did Netscape receive and how much did Netscape's underwriters receive to help in issuing the stock if investors paid \$53.75 per share? What do the underwriters do to earn their fee?

International Company

FRA 2. *Roche Group* is a giant Swiss pharmaceutical company. Its stockholders' equity shows how little importance common stock, called *share capital*, typically plays in the financing of Swiss companies:¹⁶

	1999	1998
Shareholders' Equity (in millions of Swiss francs)		
Share Capital	160	160
Retained Earnings	26,669	21,655
Total Shareholders' Equity	26,829	21,815

When Swiss companies need financing, they often rely on debt financing from large Swiss banks and from other debt markets. With only 160 million Swiss francs (1.6 million shares) in share capital, Roche has had few stock issues in its history. This amount compares to over 43 billion Swiss francs in liabilities. Also, Roche has been enormously profitable, having built up retained earnings of more than 26 billion Swiss francs over the years. The company also pays a substantial dividend that totaled 750 million Swiss francs in 1999. Calculate the dividends per share and dividends yield assuming a share price of 18,100 Swiss francs. Also, assuming that dividends and net income were the only factors that affected retained earnings during 1999, how much did Roche earn in 1999 in U.S. dollars (use an exchange rate of 1.7 Swiss francs to the dollar)? What was Roche's return on equity?

Toys "R" Us Annual Report

FRA 3. Refer to the Toys "R" Us annual report to answer the following questions:

1. What type of capital stock does Toys "R" Us have? What is the par value? How many shares are authorized, issued, and outstanding at the end of 2000?

LO 3 Stockholders' Equity LO 4 and Dividends



LO 1 Stockholders' Equity LO 3 LO 7 LO 8



2. What is the dividends yield for Toys "R" Us and its relationship to the investors' total return? Does the company rely mostly on stock or on earnings for its stockholders' equity?
3. From the statement of stockholders' equity, how has management's policy with regard to treasury stock changed over the past three years? What favorable effects did the stock buybacks have?
4. Does the company have a stock option plan? To whom do the stock options apply? Do employees have significant stock options? Given the market price of the stock shown in the report, do these options represent significant value to the employees?
5. Calculate and discuss the price/earnings ratio and return on equity for 1999 and 2000. The average share price for the fourth quarter was \$18 and \$15 for 1999 and 2000, respectively.

Fingraph® Financial Analyst™

FRA 4. Select any two companies from the same industry in the Fingraph® Financial Analyst™ CD-ROM software.

1. In the annual reports for the companies you have selected, identify the stockholders' equity section of the balance sheet and reference to any stockholders' equity accounts in the summary of significant accounting policies or notes to the financial statements. Do the companies have more than one kind of capital stock? What are the characteristics of each type of capital stock? Do the companies have treasury stock? Do the companies have an employee stock option plan?
2. Find the earnings per share and dividends per share in the annual reports for both companies. Also, find in the financial section of your local paper the current market prices of the companies' common stock. Prepare a table that summarizes this information and that shows the price/earnings ratio and the dividends yield.
3. Locate the statements of cash flows in the two companies' annual reports. Has the company issued capital stock or repurchased its stock in the last three years?
4. Find and read references to capital stock in management's discussion and analysis in each annual report.
5. Write a one-page executive summary that highlights the types of capital stock for these companies, the significance of treasury stock, and any employee stock option plan; also compare the price/earnings ratio and the dividends yield trends of the two companies, including reference to management's assessment. Include your table as an attachment to your report.

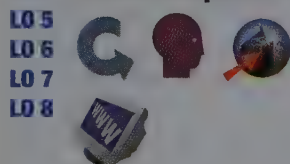
Internet Case

FRA 5. Many Internet start-up companies have gone public in recent years. These companies are generally unprofitable and require a great deal of cash to finance expansion. They also reward their employees with stock options. Choose any two of the following Internet companies: *Amazon.com*, *Yahoo*, *eBay Inc.*, and *AOL-Time Warner*. Through the Needles Accounting Resource Center at <http://college.hmco.com>, find companies under web links and go to the web sites for the two companies you have selected. In the latest annual report for each of the companies, look at the financing activities section of the statement of cash flows for the last three years. How have your two companies financed their businesses? Have they issued stock or long-term debt? Have they purchased treasury stock, paid dividends, or issued stock under stock option plans? Are the companies profitable (see net income or earnings at the top of the statement)? Are your findings in line with your expectations about these young Internet companies? Find each company's stock price, either on the Web (many companies have it on their homepage) or in the newspaper, and compare it to the average issue price of that company's past stock issues. Summarize your findings and conclusions.

LO 1 Comparative
LO 3 Analysis of
LO 7 Stockholders' Equity
LO 8



LO 1 Comparison of Financing of
LO 4 Internet Companies



ENDNOTES

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The Corporate Income Statement and the Statement of Stockholders' Equity

LEARNING OBJECTIVES

- 1** Identify the issues related to evaluating the quality of a company's earnings.
- 2** Prepare a corporate income statement.
- 3** Show the relationships among income taxes expense, deferred income taxes, and net of taxes.
- 4** Describe the disclosure on the income statement of discontinued operations, extraordinary items, and accounting changes.
- 5** Compute earnings per share.
- 6** Prepare a statement of stockholders' equity.
- 7** Account for stock dividends and stock splits.
- 8** Calculate book value per share.



DECISION POINT: A USER'S FOCUS



DaimlerChrysler AG

DaimlerChrysler AG is one of the largest automobile companies in the world. Interpreting the operating results of such a company is not always easy. For instance, consider DaimlerChrysler's performance for the three-year period from 1997 to 1999, as measured by earnings per share.¹ The company's statements are presented in Euros, the new European currency. Net income per share declined from €6.90 to €5.03 in 1998 but rebounded to €5.73 in 1999. However, income before extraordinary items declined from €6.90 in 1997 to €5.09 in 1999. Someone not familiar with the structure and use of corporate income statements might be confused by this apparent contradiction. Which is the best measure of DaimlerChrysler's performance?

Financial Highlights

	1999	1998	1997
Earnings per share (in Euros):			
Basic earnings per share			
Income before extraordinary items	5.09	5.16	6.90
Extraordinary items	.64	(.13)	—
Net income	<u>5.73</u>	<u>5.03</u>	<u>6.90</u>

K/R Earnings or net income per share is the "bottom line" that many investors look at to judge the success or failure of a company. Just looking at the bottom line, however, can be misleading. The corporate income statement contains a number of infrequent increases and decreases made more or less at the discretion of management that will result in variations in results. In 1998, DaimlerChrysler had a loss on early extinguishment of debt that reduced its earnings per share by €.13. In 1999, the company had a gain on the disposal of a business that increased earnings per share by €.64. These latter items are called *extraordinary items*, or rare items that occur because management has made the decision to engage in these transactions. Because of these items, net income per share is not the best gauge of DaimlerChrysler's ongoing performance in its normal operations. Net income before extraordinary items is a better measure. Knowledge of issues involving quality of earnings and the components of corporate income statements is essential to understanding and analyzing the operations of companies like DaimlerChrysler.

Performance Measurement: Quality of Earnings Issues

OBJECTIVE

1 Identify the issues related to evaluating the quality of a company's earnings

Current and expected earnings are important factors to consider in evaluating a company's performance and analyzing its prospects. In fact, a survey of 2,000 members of the Association for Investment Management and Research indicated that the two most important economic indicators in evaluating common stocks were expected changes in earnings per share and expected return on equity.² Net income is a key component of both measures.

Because of the importance of net income, or the "bottom line," in measuring a company's prospects, there is significant interest in evaluating the quality of the net income figure, or the **quality of earnings**. The quality of a company's earnings refers to the substance of earnings and their sustainability into future accounting periods. The quality of earnings may be affected by (1) the accounting methods and estimates the company's management chooses and (2) the nature of nonoperating items on the income statement.



Choice of Accounting Methods and Estimates

Choices of accounting methods and estimates affect a firm's operating income. To assure proper matching of revenues and expenses, accounting requires cost allocations and estimates of data that will not be known with certainty until some future date. For example, accountants estimate the useful life of assets when they are acquired. However, technological obsolescence could shorten the expected useful life, or excellent maintenance and repairs could lengthen it. The actual useful life will not be known with certainty until some future date. The choice of estimate affects both current and future operating income.

Because there is considerable latitude in the choice of estimates, management and other financial statement users must be aware of the impact of accounting estimates on reported operating income. Estimates include percentage of uncollectible accounts receivable, sales returns, useful life, residual or salvage value, total units of production, total recoverable units of natural resource, amortization period, expected warranty claims, and expected environmental cleanup costs.

These estimates are not all equally important to every firm. The relative importance of each estimate depends on the industry in which the firm operates. For example, the estimate of uncollectible receivables for a credit card firm, such as American Express, or a financial services firm, such as Bank of America, can have a



FOCUS ON BUSINESS PRACTICE

Quality of earnings is an important issue for investors.

For example, analysts for Twentieth Century Mutual Funds, a major investment company, make adjustments to a company's reported financial performance to create a more accurate picture of the

company's ongoing operations. Assume a paper company reports earnings of \$1.30 per share, which makes year-to-year comparisons unusually strong. Upon further investigation, however, it is found that the per share number includes a one-time gain on the sale of assets of \$.25 per share. Twentieth Century would list the company in its data base as earning only \$1.05 per share. "These kinds of adjustments help assure long-term decisions aren't based on one-time events."³



material impact on earnings, but the choice of useful life may be less important because depreciable assets represent only a small percentage of total assets. Toys “R” Us has very few receivables, but it has substantial investment in depreciable assets; thus choice of useful life and residual value are much more important than uncollectible accounts receivable.

The choice of methods also affects a firm’s operating income. Generally accepted accounting methods include uncollectible receivable methods (net sales or aging of accounts receivable), inventory methods (last-in, first-out [LIFO], first-in, first-out [FIFO], or average cost), depreciation methods (accelerated, production, or straight-line), and revenue recognition methods. These methods are designed to match revenues and expenses. Costs are allocated based on a determination of the benefits to the current period (expenses) versus the benefits to future periods (assets). The expenses are estimates, and the period or periods benefited cannot be demonstrated conclusively. The estimates are also subjective, because in practice it is hard to justify one method of estimation over another.

For these reasons, management, the accountant, and the financial statement user need to understand the possible effects of different accounting procedures on net income and financial position. Some methods and estimates are more conservative than others because they tend to produce a lower net income in the current period. For example, suppose that two companies have similar operations, but one uses FIFO for inventory costing and straight-line (SL) for computing depreciation, whereas the other uses LIFO for inventory costing and double-declining-balance (DDB) for computing depreciation. The income statements of the two companies might appear as follows:

	FIFO and SL	LIFO and DDB
Net Sales	\$500,000	\$500,000
Goods Available for Sale	\$300,000	\$300,000
Less Ending Inventory	60,000	50,000
Cost of Goods Sold	\$240,000	\$250,000
Gross Margin	\$260,000	\$250,000
Less: Depreciation Expense	\$ 40,000	\$ 80,000
Other Expenses	170,000	170,000
Total Operating Expenses	\$210,000	\$250,000
Operating Income	\$ 50,000	\$ —

The operating income for the firm using LIFO and DDB is lower because, in periods of rising prices, the LIFO inventory costing method produces a higher cost of goods sold, and, in the early years of an asset’s useful life, accelerated depreciation yields a higher depreciation expense. The result is lower operating income. However, future operating income is expected to be higher.

The \$50,000 difference in operating income stems only from the differences in accounting methods. Differences in the estimated lives and residual values of the plant assets could lead to an even greater variation. In practice, of course, differences in net income occur for many reasons, but the user must be aware of the discrepancies that can occur as a result of the accounting methods chosen by management. In general, an accounting method or estimate that results in lower current earnings is considered to produce a better quality of operating income.

The existence of such alternatives could cause problems in the interpretation of financial statements were it not for the conventions of full disclosure and consistency. Full disclosure requires that management explain the significant accounting policies used in preparing the financial statements in a note to the statements.

Consistency requires that the same accounting procedures be followed from year to year. If a change in procedure is made, the nature of the change and its monetary effect must be explained in a note.

Nature of Nonoperating Items



The corporate income statement consists of several components, as shown in Exhibit 1. The top of the statement presents income from current ongoing operations, called *income from continuing operations*. The lower part of the statement can contain such nonoperating items as discontinued operations, extraordinary gains and losses, and effects of accounting changes. Those items may drastically affect the bottom line, or net income, of the company. In fact, in Exhibit 1, earnings per common share associated with continuing operations were \$2.81, but net income per share was \$3.35, or 19.2 percent higher.

For practical reasons, the calculations of trends and ratios are based on the assumption that net income and other components are comparable from year to year and from company to company. However, in making interpretations, the astute analyst will always look beyond the ratios to the quality of the components. For example, restructuring charges, if they are large enough, can make a company's

Exhibit 1

A Corporate Income Statement

Junction Corporation Income Statement For the Year Ended December 31, 20x1	
Revenues	\$925,000
Less Costs and Expenses	500,000
Income from Continuing Operations Before Income Taxes	\$425,000
Income Taxes Expense	144,500
Income from Continuing Operations	\$280,500
Discontinued Operations	
Income from Operations of Discontinued Segment (net of taxes, \$35,000)	\$90,000
Loss on Disposal of Segment (net of taxes, \$42,000)	(73,000)
	17,000
Income Before Extraordinary Items and Cumulative Effect of Accounting Change	\$297,500
Extraordinary Gain (net of taxes, \$17,000)	43,000
Subtotal	\$340,500
Cumulative Effect of a Change in Accounting Principle (net of taxes, \$5,000)	(6,000)
Net Income	\$334,500
Earnings per Common Share:	
Income from Continuing Operations	\$ 2.81
Discontinued Operations (net of taxes)	.17
Income Before Extraordinary Items and Cumulative Effect of Accounting Change	\$ 2.98
Extraordinary Gain (net of taxes)	.43
Cumulative Effect of Accounting Change (net of taxes)	(.06)
Net Income	\$ 3.35

FOCUS ON BUSINESS ETHICS

External users of financial statements depend on management's honesty and openness in disclosing factual information about a company. In the vast majority of cases, management's reports are reliable, but on occasion, employees (called *whistle-blowers*) may publicly

disclose wrongdoing on the part of their company. For example, after the internal audit chief of W. R. Grace, a chemical company, was fired, he made known to the SEC his concerns of deliberate deferral of reporting of income by W. R. Grace. The goal was to show growth in earnings within the targeted range of 20–24 percent, which analysts were expecting. Later the company reversed the deferral of income to offset poor operating results. The SEC is currently investigating W. R. Grace for fraudulently manipulated earnings.⁴



return on equity look better. In a recent year, Boeing Company, an aircraft manufacturer, took charges of \$4 billion resulting in a loss of \$178 million. The effect of this charge reduced equity by almost 20 percent. Return on equity should increase in next period.⁵ Although such write-offs reduce a company's net worth, they usually do not affect current cash flows or operations and in most cases are ignored by analysts assessing current performance.

In some cases, a company may boost income by including one-time gains. For example, Sears, Roebuck and Co., a multiline retailer providing a wide array of merchandise and services, used a gain from the change of an accounting principle to bolster its net income by \$136 million, or \$.35 per share, in 1997. Without the gain, earnings per share (EPS) actually decreased from \$3.12 to \$2.92, not increased as Sears originally reported.⁶ The quality of Sears's earnings is in fact lower than it might appear on the surface. Unless analysts are prepared to go beyond the "bottom line" in analyzing and interpreting financial reports, they can come to the wrong conclusions.

The Corporate Income Statement

OBJECTIVE

2 Prepare a corporate income statement

Accounting organizations have not specified the format of the income statement because they have considered flexibility more important than a standard format. Either the single-step or the multistep form can be used. However, the accounting profession has taken the position that income for a period should be all-inclusive, **comprehensive income**, which is different from net income.⁷ Comprehensive income is the change in a company's equity during a period from sources other than owners and includes net income, change in unrealized investment gains and losses, and other items affecting equity. Companies are reporting comprehensive income and its components as a separate financial statement, or as part of another financial statement.

In the first year of this requirement, 347 of 600 large companies reported comprehensive income. Of these, 78 percent reported comprehensive income on the statement of stockholders' equity, 10 percent reported it on a separate statement, and only 2 percent reported it on the income statement.⁸

Net income or loss for a period includes all revenues, expenses, gains, and losses over the period, except for prior period adjustments. As a result, several items must be added to the income statement, among them discontinued operations, extraordinary items, and accounting changes. The Financial Accounting Standards Board has proposed adding goodwill amortization to this list, moving it down from

income from operations. In addition, earnings per share figures must be disclosed. Exhibit 1 illustrated a corporate income statement and the required disclosures. The following sections discuss the components of the corporate income statement, beginning with income taxes expense.

Income Taxes Expense

OBJECTIVE
3 Show the relationships among income taxes expense, deferred income taxes, and net of taxes

Corporations determine their taxable income (the amount on which taxes are paid) by subtracting allowable business deductions from includable gross income. The federal tax laws determine which business expenses may be deducted and which cannot be deducted from taxable gross income.*

The tax rates that apply to a corporation’s taxable income are shown in Table 1. A corporation with taxable income of \$70,000 would have a federal income tax liability of \$12,500: \$7,500 (the tax on the first \$50,000 of taxable income) plus \$5,000 (25 percent of the \$20,000 earned in excess of \$50,000).

Income taxes expense is the expense recognized in the accounting records on an accrual basis that applies to income from continuing operations. This expense may or may not equal the amount of taxes actually paid by the corporation and recorded as income taxes payable in the current period. The amount payable is determined from taxable income, which is measured according to the rules and regulations of the income tax code.

For the sake of convenience, most small businesses keep their accounting records on the same basis as their tax records, so that the income taxes expense on the income statement equals the income taxes liability to be paid to the Internal Revenue Service (IRS). This practice is acceptable when there is no material difference between the income on an accounting basis and the income on an income tax basis. However, the purpose of accounting is to determine net income in accordance with generally accepted accounting principles, not to determine taxable income and tax liability.

Management has an incentive to use methods that minimize the firm’s tax liability, but accountants, who are bound by accrual accounting and the materiality concept, cannot let tax procedures dictate their method of preparing financial statements if the result would be misleading. As a consequence, there can be a material difference between accounting and taxable incomes, especially in larger businesses. This discrepancy can result from differences in the timing of the recognition of revenues and expenses under the two accounting methods. Some possible variations are shown below.

	Accounting Method	Tax Method
Expense recognition	Accrual or deferral	At time of expenditure
Accounts receivable	Allowance	Direct charge-off
Inventories	Average cost	FIFO
Depreciation	Straight-line	Modified Accelerated Cost Recovery System

Deferred Income Taxes

The accounting method used to accrue income taxes expense on the basis of accounting income whenever there are differences between accounting and taxable income is called **income tax allocation**. The account used to record the difference between the income taxes expense and income taxes payable is called **Deferred Income Taxes**. For example, Junction Corporation shows income taxes expense of \$144,500 on its income statement but has actual income taxes payable

*Rules for calculating and reporting taxable income in specialized industries such as banking, insurance, mutual funds, and cooperatives are highly technical and may vary significantly from those discussed in this chapter.

Table 1. Tax Rate Schedule for Corporations, 2000

Taxable Income		Tax Liability	
Over	But Not Over		Of the Amount Over
—	\$ 50,000	0 + 15%	—
\$ 50,000	75,000	\$ 7,500 + 25%	\$ 50,000
75,000	100,000	13,750 + 34%	75,000
100,000	335,000	22,250 + 39%	100,000
335,000	10,000,000	113,900 + 34%	335,000
10,000,000	15,000,000	3,400,000 + 35%	10,000,000
15,000,000	18,333,333	5,150,000 + 38%	15,000,000
18,333,333	—	6,416,667 + 35%	18,333,333

Note: Tax rates are subject to change by Congress.

to the IRS of \$92,000. The entry that follows is to record the estimated income taxes expense applicable to income from continuing operations using the income tax allocation procedure.

A = L + OE	Dec. 31	Income Taxes Expense	144,500	
+		Income Taxes Payable		92,000
+		Deferred Income Taxes		52,500
		To record estimated current and deferred income taxes		

In other years, it is possible for Income Taxes Payable to exceed Income Taxes Expense, in which case the same entry is made except that Deferred Income Taxes is debited.

The Financial Accounting Standards Board has issued specific rules for recording, measuring, and classifying deferred income taxes.⁹ Deferred income taxes are recognized for the estimated future tax effects resulting from temporary differences in the valuation of assets, liabilities, equity, revenues, expenses, gains, and losses for tax and financial reporting purposes. Temporary differences include revenues and expenses or gains and losses that are included in taxable income before or after they are included in financial income. In other words, the recognition point for revenues, expenses, gains, and losses is not the same for tax and financial reporting. For example, advance payments for goods and services, such as magazine subscriptions, are not recognized in financial income until the product is shipped, but for tax purposes they are usually recognized as revenue when cash is received. The result is that taxes paid exceed tax expense, which creates a deferred income tax asset (or prepaid taxes).

Classification of deferred income taxes as current or noncurrent depends on the classification of the related asset or liability that created the temporary difference. For example, the deferred income tax asset mentioned above would be classified as current if unearned subscription revenue is classified as a current liability. On the other hand, the temporary difference arising from depreciation is related to a long-term depreciable asset. Therefore, the resulting deferred income tax would be classified as long-term. However, if a temporary difference is not related to an asset or liability, then it is classified as current or noncurrent based on its expected date of reversal. Temporary differences and the classification of deferred income taxes that results are covered in depth in more advanced courses.

Each year, the balance of the Deferred Income Taxes account is evaluated to determine whether it still accurately represents the expected asset or liability in light of legislated changes in income tax laws and regulations. If changes have

occurred, an adjusting entry to bring the account balance into line with current laws is required. For example, a decrease in corporate income tax rates, like the one that occurred in 1987, means that a company with deferred income tax liabilities will pay less in taxes in future years than the amount indicated by the credit balance of its Deferred Income Taxes account. As a result, the company would debit Deferred Income Taxes to reduce the liability and credit Gain from Reduction in Income Tax Rates. This credit increases the reported income on the income statement. If the tax rate increases in future years, a loss would be recorded and the deferred income tax liability would be increased.

In any given year, the amount a company pays in income taxes is determined by subtracting (or adding, as the case may be) the deferred income taxes for that year, as reported in the notes to the financial statements, from (or to) income taxes expense, which is reported in the financial statements. In subsequent years, the amount of deferred income taxes can vary based on changes in tax laws and rates.

Some understanding of the importance of deferred income taxes to financial reporting can be gained from studying a survey of the financial statements of 600 large companies. About 67 percent reported deferred income taxes with a credit balance in the long-term liability section of the balance sheet.¹⁰

Net of Taxes

The phrase **net of taxes**, as used in Exhibit 1, means that the effect of applicable taxes (usually income taxes) has been considered in determining the overall effect of an item on the financial statements. The phrase is used on the corporate income statement when a company has items that must be disclosed in a separate section. Each such item should be reported net of the applicable income taxes to avoid distorting the income taxes expense associated with ongoing operations and the resulting net operating income. For example, assume that a corporation with operating income before taxes of \$120,000 has a total tax expense of \$66,000 and that the total income includes a gain of \$100,000 on which a tax of \$30,000 is due. Also assume that the gain is not part of normal operations and must be disclosed separately on the income statement as an extraordinary item (explained later). This is how the tax expense would be reported on the income statement:

Operating Income Before Taxes	\$120,000
Income Taxes Expense	36,000
Income Before Extraordinary Item	\$ 84,000
Extraordinary Gain (net of taxes, \$30,000)	70,000
Net Income	<u>\$154,000</u>

If all the tax expense were deducted from operating income before taxes, both the income before extraordinary item and the extraordinary gain would be distorted.

A company follows the same procedure in the case of an extraordinary loss. For example, assume the same facts as before except that the total tax expense is only \$6,000 because of a \$100,000 extraordinary loss. The result is a \$30,000 tax savings, shown as follows:

Operating Income Before Taxes	\$120,000
Income Taxes Expense	36,000
Income Before Extraordinary Item	\$ 84,000
Extraordinary Loss (net of taxes, \$30,000)	(70,000)
Net Income	<u>\$ 14,000</u>

In Exhibit 1, the total of the income tax items is \$149,500. That amount is allocated among five statement components, as follows:

Income taxes expense on income from continuing operations	\$144,500
Income tax on income from a discontinued segment	35,000
Income tax savings on the loss on the disposal of the segment	(42,000)
Income tax on the extraordinary gain	17,000
Income tax savings on the cumulative effect of a change in accounting principle	(5,000)
Total income taxes expense	<u>\$149,500</u>

Discontinued Operations

OBJECTIVE

4 Describe the disclosure on the income statement of discontinued operations, extraordinary items, and accounting changes

Large companies in the United States usually have many **segments**. A segment may be a separate major line of business or serve a separate class of customer. For example, a company that makes heavy drilling equipment may also have another line of business, such as the manufacture of mobile homes. A large company may discontinue or otherwise dispose of certain segments of its business that do not fit its future plans or are not profitable. **Discontinued operations** are segments of a business that are no longer part of its ongoing operations. Generally accepted accounting principles require that gains and losses from discontinued operations be reported separately on the income statement. Such separation makes it easier to evaluate the ongoing activities of the business.

In Exhibit 1, the disclosure of discontinued operations has two parts. One part shows that after the date of the decision to discontinue, the income from operations of the segment that has been disposed of was \$90,000 (net of \$35,000 taxes). The other part shows that the loss from the disposal of the segment was \$73,000 (net of \$42,000 tax savings). Computation of the gains or losses is covered in more advanced accounting courses. The disclosure has been described, however, to give a complete view of the corporate income statement.

Extraordinary Items

The Accounting Principles Board, in its *Opinion No. 30*, defines **extraordinary items** as “events or transactions that are distinguished by their unusual nature and by the infrequency of their occurrence.”¹¹ Unusual and infrequent occurrences are explained in the opinion as follows:

Unusual Nature—the underlying event or transaction should possess a high degree of abnormality and be of a type clearly unrelated to, or only incidentally related to, the ordinary and typical activities of the entity, taking into account the environment in which the entity operates.

Infrequency of Occurrence—the underlying event or transaction should be of a type that would not reasonably be expected to recur in the foreseeable future, taking into account the environment in which the entity operates.¹²

If an item is both unusual and infrequent (and material in amount), it should be reported separately from continuing operations on the income statement. The disclosure allows readers to identify gains or losses in income that would not be expected to happen again soon. Items usually treated as extraordinary include (1) an uninsured loss from flood, earthquake, fire, or theft; (2) a gain or loss resulting from the passage of a new law; (3) the expropriation (taking) of property by a foreign government; and (4) a gain or loss from the early retirement of debt. Gains or losses from extraordinary items should be reported on the income statement after discontinued operations. And they should be shown net of applicable taxes. In a recent year, 74 (12 percent) of 600 large companies reported extraordinary items

on their income statements.¹³ In Exhibit 1, the extraordinary gain was \$43,000 after applicable taxes of \$17,000.

Accounting Changes

Consistency, which is one of the basic conventions of accounting, means that companies must apply the same accounting principles from year to year. However, a company is allowed to make accounting changes if current procedures are incorrect or inappropriate. For example, a change from the FIFO to the LIFO inventory method can be made if there is adequate justification for the change. Adequate justification usually means that if the change occurs, the financial statements will better show the financial activities of the company. A company's desire to lower the amount of income taxes it pays is not considered adequate justification for an accounting change. If justification does exist and an accounting change is made, generally accepted accounting principles require the disclosure of the change in the financial statements.

The **cumulative effect of an accounting change** is the effect that the new accounting principle would have had on net income in prior periods if it had been applied instead of the old principle. This effect is shown on the income statement immediately after extraordinary items.¹⁴ For example, assume that in the five years prior to 20xx, Junction Corporation had used the straight-line method to depreciate its machinery. This year, the company retroactively changed to the double-declining-balance method of depreciation. The controller computed the cumulative effect of the change in depreciation charges (net of taxes) as \$6,000, as follows:

Cumulative, five-year double-declining-balance depreciation	\$29,000
Less cumulative, five-year straight-line depreciation	18,000
Before tax effect	\$11,000
Income tax savings	5,000
Cumulative effect of accounting change	<u>\$ 6,000</u>

Relevant information about the accounting change is shown in the notes to the financial statements. The change results in \$11,000 of depreciation expense for prior years being deducted in the current year, in addition to the current year's depreciation costs included in the \$500,000 costs and expenses section of the income statement. This expense must be shown in the current year's income statement as a reduction in income (see Exhibit 1). In 1997, 62, or 10 percent, of 600 large companies reported changes in accounting procedures.¹⁵ Further study of accounting changes is left to more advanced accounting courses.

Earnings per Share

OBJECTIVE

5 Compute earnings per share

Readers of financial statements use earnings per share information to judge a company's performance and to compare it with the performance of other companies. Because such information is so important, the Accounting Principles Board concluded that earnings per share of common stock should be presented on the face of the income statement.¹⁶ As shown in Exhibit 1, the information is usually disclosed just below the net income.

An earnings per share amount is always shown for (1) income from continuing operations, (2) income before extraordinary items and the cumulative effect of accounting changes, (3) the cumulative effect of accounting changes, and (4) net income. If the statement shows a gain or loss from discontinued operations or a gain or loss on extraordinary items, earnings per share amounts can also be presented for them. The following per share data from the income statement of Minnesota Mining and Manufacturing Company (3M) show why it is a good idea to study the components of earnings per share.¹⁷



Financial Highlights



	Years Ended December 31		
	1999	1998	1997
Earnings per share—Basic:			
Continuing operations	\$4.39	\$3.01	\$5.14
Extraordinary loss	—	(.10)	—
Net income	<u>\$4.39</u>	<u>\$2.91</u>	<u>\$5.14</u>

Note that net income was influenced by a special item in 1998: An extraordinary loss decreased income from continuing operations by \$.10 per share to a basic net income of \$2.91 per share. In 1999, the company had no special items; thus, 100 percent of 3M's basic earnings per share were attributable to continuing operations.

Basic earnings per share is net income applicable to common stock divided by the weighted-average number of common shares outstanding. To compute this figure, one must determine if during the year the number of common shares outstanding changed, and if the company paid preferred stock dividends.

When a company has only common stock and has the same number of shares outstanding throughout the year, the earnings per share computation is simple. From Exhibit 1, we know that Junction Corporation reported net income of \$334,500. Assume that the company had 100,000 shares of common stock outstanding for the entire year. The earnings per share of common stock is computed as follows:

$$\text{Earnings per Share} = \frac{\$334,500}{100,000 \text{ shares}} = \$3.35 \text{ per share}$$

If the number of shares outstanding changes during the year, it is necessary to figure the weighted-average number of shares outstanding for the year. Suppose that Junction Corporation had the following amounts of common shares outstanding during various periods of the year: January–March, 100,000 shares; April–September, 120,000 shares; and October–December, 130,000 shares. The weighted-average number of common shares outstanding and basic earnings per share would be found this way:

100,000 shares × $\frac{3}{12}$ year	25,000
120,000 shares × $\frac{6}{12}$ year	60,000
130,000 shares × $\frac{3}{12}$ year	32,500
Weighted-average common shares outstanding	<u>117,500</u>

$$\begin{aligned} \text{Basic Earnings per Share} &= \frac{\text{Net Income}}{\text{Weighted-Average Common Shares Outstanding}} \\ &= \frac{\$334,500}{117,500 \text{ shares}} = \$2.85 \text{ per share} \end{aligned}$$

If a company has nonconvertible preferred stock outstanding, the dividend for that stock must be subtracted from net income before earnings per share for common stock are computed. Suppose that Junction Corporation has preferred stock on which the annual dividend is \$23,500. Earnings per share on common stock would be \$2.65 [(\$334,500 − \$23,500) ÷ 117,500 shares].

Companies with a capital structure in which there are no bonds, stocks, or stock options that could be converted into common stock are said to have a **simple**

capital structure. The earnings per share for these companies is computed as shown on the previous page. Some companies, however, have a **complex capital structure**, which includes exercisable stock options or convertible stocks and bonds. Those convertible securities have the potential of diluting the earnings per share of common stock. *Potential dilution* means that a stockholder's proportionate share of ownership in a company could be reduced through the conversion of stocks or bonds or the exercise of stock options, which would increase the total shares outstanding.

For example, suppose that a person owns 10,000 shares of a company, which equals 2 percent of the outstanding shares of 500,000. Now suppose that holders of convertible bonds convert the bonds into 100,000 shares of stock. The person's 10,000 shares would then equal only 1.67 percent ($10,000 \div 600,000$) of the outstanding shares. In addition, the added shares outstanding would lower earnings per share and would most likely lower market price per share.

Because stock options and convertible preferred stocks or bonds have the potential to dilute earnings per share, they are referred to as **potentially dilutive securities**. When a company has a complex capital structure, it must report two earnings per share figures: basic earnings per share and diluted earnings per share.¹⁸ **Diluted earnings per share** are calculated by adding all potentially dilutive securities to the denominator of the basic earnings per share calculation. This figure shows stockholders the maximum potential effect of dilution of their ownership position in the company.

The difference between basic and diluted earnings per share can be significant. For example, consider the results reported by Dollar General Corporation, a successful retail discount chain:



Financial Highlights

	Years Ended December 31		
	1999	1998	1997
Basic earnings per share	\$.89	\$.81	\$.64
Diluted earnings per share	.81	.68	.54

Note that while both measures of earnings per share are increasing, the pattern of increase is different and basic earnings per share are greater by at least 10 percent in every year.¹⁹

The computation of diluted earnings per share is a complex process and is reserved for more advanced courses.

The Statement of Stockholders' Equity

OBJECTIVE

6 Prepare a statement of stockholders' equity

The **statement of stockholders' equity**, also called the *statement of changes in stockholders' equity*, summarizes the changes in the components of the stockholders' equity section of the balance sheet. More and more companies are using this statement in place of the statement of retained earnings because it reveals much more about the year's stockholders' equity transactions. In the statement of stockholders' equity in Exhibit 2, for example, the first line shows the beginning balance of each account in the stockholders' equity section. Each subsequent line discloses the effects of transactions on those accounts. It is possible to determine from the statement that during 20x1 Tri-State Corporation issued 5,000 shares of common stock for \$250,000, had a conversion of \$100,000 of preferred stock into

Exhibit 2

A Statement of Stockholders' Equity

Tri-State Corporation
Statement of Stockholders' Equity
For the Year Ended December 31, 20x1

	Preferred Stock \$100 Par Value 8% Convertible	Common Stock \$10 Par Value	Paid-in Capital in Excess of Par Value, Common	Retained Earnings	Treasury Stock	Accumulated Other Com- prehensive Income	Total
Balance, December 31, 20x0	\$400,000	\$300,000	\$300,000	\$600,000	—		\$1,600,000
Issuance of 5,000 Shares of Common Stock		50,000	200,000				250,000
Conversion of 1,000 Shares of Preferred Stock into 3,000 Shares of Common Stock	(100,000)	30,000	70,000				—
10 Percent Stock Dividend on Common Stock, 3,800 Shares		38,000	152,000	(190,000)			—
Purchase of 500 Shares of Treasury Stock					(\$24,000)		(24,000)
Foreign Currency Translation Adjustment						(\$10,000)	(10,000)
Net Income				270,000			270,000
Cash Dividends							
Preferred Stock				(24,000)			(24,000)
Common Stock				(47,600)			(47,600)
Balance, December 31, 20x1	<u>\$300,000</u>	<u>\$418,000</u>	<u>\$722,000</u>	<u>\$608,400</u>	<u>(\$24,000)</u>	<u>(\$10,000)</u>	<u>\$2,014,400</u>

common stock, declared and issued a 10 percent stock dividend on common stock, had a net purchase of treasury shares of \$24,000, had a foreign currency translation loss of \$10,000 reported as accumulated other comprehensive income, earned net income of \$270,000, and paid cash dividends on both preferred and common stock. The ending balances of the accounts are presented at the bottom of the statement. Those accounts and balances make up the stockholders' equity section of Tri-State's balance sheet on December 31, 20x1, as shown in Exhibit 3.

Retained Earnings

Notice that in Exhibit 2 the Retained Earnings column has the same components as the statement of retained earnings. The **retained earnings** of a company are the part of stockholders' equity that represents stockholders' claims to assets arising from the earnings of the business. Retained earnings equal a company's profits since the date of its inception, less any losses, dividends to stockholders, or transfers to contributed capital.

It is important to remember that retained earnings are not the assets themselves. The existence of retained earnings means that assets generated by profitable operations have been kept in the company to help it grow or meet other business needs. A credit balance in Retained Earnings is *not* directly associated with a

Exhibit 3
Stockholders' Equity Section of
a Balance Sheet

Tri-State Corporation Stockholders' Equity December 31, 20x1			
Contributed Capital			
Preferred Stock, \$100 par value, 8 percent convertible, 10,000 shares authorized, 3,000 shares issued and outstanding			\$ 300,000
Common Stock, \$10 par value, 100,000 shares authorized, 41,800 shares issued, 41,300 shares outstanding	\$418,000		
Paid-in Capital in Excess of Par Value, Common	722,000	1,140,000	
Total Contributed Capital			\$1,440,000
Retained Earnings			608,400
Total Contributed Capital and Retained Earnings			\$2,048,400
Less Treasury Stock, Common (500 shares, at cost)	\$ 24,000		
Foreign Currency Translation Adjustment	10,000	34,000	
Total Stockholders' Equity			\$2,014,400

specific amount of cash or designated assets. Rather, such a balance means that assets as a whole have been increased.

Retained Earnings can carry a debit balance. Generally, this happens when a company's dividends and subsequent losses are greater than its accumulated profits from operations. In such a case, the firm is said to have a **deficit** (debit balance) in Retained Earnings. A deficit is shown in the stockholders' equity section of the balance sheet as a deduction from contributed capital.

A corporation may be required or may want to restrict all or a portion of its retained earnings. A **restriction on retained earnings** means that dividends can be declared only to the extent of the *unrestricted* retained earnings. The following are several reasons a company might restrict retained earnings:

1. *A contractual agreement.* For example, bond indentures may place a limitation on the dividends the company can pay.
2. *State law.* Many states do not allow a corporation to distribute dividends or purchase treasury stock if doing so reduces equity below a minimum level because this would impair the legal capital of the company.
3. *Voluntary action by the board of directors.* Often a board decides to retain assets in the business for future needs. For example, the company may be planning to build a new plant and may want to show that dividends will be limited to save enough money for the building. A company might also restrict retained earnings to show a possible future loss of assets resulting from a lawsuit.

A restriction on retained earnings does not change the total retained earnings or stockholders' equity of the company. It simply divides retained earnings into two parts: restricted and unrestricted. The unrestricted amount represents earnings kept in the business that the company can use for dividends and other purposes. Also, the restriction of retained earnings does not restrict cash or other assets in any way. It simply explains to the readers of the financial statements that a certain amount of assets generated by earnings will remain in the business for the purpose stated. It is still management's job to make sure enough cash or assets are on hand to fulfill the purpose. Also, the removal of a restriction does not necessarily mean that the board of directors can then declare a dividend.

FOCUS ON INTERNATIONAL BUSINESS

Restrictions on retained earnings, called *reserves*, are much more common in some foreign countries than in the United States. In Sweden, for instance, reserves are used to respond to fluctuations in the economy. The Swedish tax code allows companies to set up contingency reserves for the purpose of maintaining financial stability. Appropriations to those reserves reduce tax-

able income and income taxes. The reserves become taxable when they are reversed, but they are available to absorb losses should they occur. For example, Skandia Group, a large Swedish insurance company, reported a net income of only SK1,242 million in 1998, less than half the result of SK3,402 million in 1997. An examination of its statement of stockholders' equity shows a transfer of SK1,277 million to restricted reserves in 1997, a good year, but restricted reserves of SK588 million were transferred back to unrestricted reserves in 1998, a less successful year. Skandia also increased its dividends in 1998 to SK384 million and still had SK12.6 billion in restricted reserves.²⁰

The most common way to disclose restricted retained earnings is by reference to a note to the financial statements. For example:

Retained Earnings (Note 15) \$900,000

Note 15:

Because of plans to expand the capacity of the company's clothing division, the board of directors has restricted retained earnings available for dividends by \$300,000.

Stock Dividends

OBJECTIVE

7 Account for stock dividends and stock splits

A **stock dividend** is a proportional distribution of shares of a corporation's stock to its shareholders. A stock dividend does not change the firm's assets and liabilities because there is no distribution of assets, as there is when a cash dividend is distributed. A board of directors may declare a stock dividend for several reasons:

1. It may want to give stockholders some evidence of the company's success without paying a cash dividend, which would affect working capital.
2. It may seek to reduce the stock's market price by increasing the number of shares outstanding, although this goal is more often met by a stock split.
3. It may want to make a nontaxable distribution to stockholders. Stock dividends that meet certain conditions are not considered income, so they are not taxed.
4. It may wish to increase the company's permanent capital by transferring an amount from retained earnings to contributed capital.

The total stockholders' equity is not affected by a stock dividend. The effect of a stock dividend is to transfer a dollar amount from retained earnings to the contributed capital section on the date of declaration. The amount transferred is the fair market value (usually, the market price) of the additional shares to be issued. The laws of most states specify the minimum value of each share transferred under a stock dividend, which is normally the minimum legal capital (par or stated value). However, generally accepted accounting principles state that market value reflects the economic effect of small stock distributions (less than 20 to 25 percent of a company's outstanding common stock) better than par or stated value does. For this reason, market price should be used to account for small stock dividends.²¹

To illustrate the accounting for a stock dividend, let us assume that Caprock Corporation has the following stockholders' equity structure:

Contributed Capital	
Common Stock, \$5 par value, 100,000 shares authorized, 30,000 shares issued and outstanding	\$ 150,000
Paid-in Capital in Excess of Par Value, Common	30,000
Total Contributed Capital	<u>\$ 180,000</u>
Retained Earnings	900,000
Total Stockholders' Equity	<u>\$1,080,000</u>

Suppose that the board of directors declares a 10 percent stock dividend on February 24, distributable on March 31 to stockholders of record on March 15, and that the market price of the stock on February 24 is \$20 per share. The entries to record the declaration and distribution of the stock dividend are shown below.

		Date of Declaration	
A = L + OE	Feb. 24	Stock Dividends Declared	60,000
-		Common Stock Distributable	15,000
+		Paid-in Capital in Excess of Par	
+		Value, Common	45,000
		Declared a 10 percent stock dividend on common stock, distributable on March 31 to stockholders of record on March 15: 30,000 shares \times .10 = 3,000 shares 3,000 shares \times \$20/share = \$60,000 3,000 shares \times \$5/share = \$15,000	
		Date of Record	
	Mar. 15	No entry required.	
		Date of Distribution	
A = L + OE	Mar. 31	Common Stock Distributable	15,000
-		Common Stock	15,000
+		Distributed a stock dividend of 3,000 shares	

The effect of this stock dividend is to permanently transfer the market value of the stock, \$60,000, from retained earnings to contributed capital and to increase the number of shares outstanding by 3,000. The Stock Dividends Declared account is used to record the total amount of the stock dividend. Retained Earnings is reduced by the amount of the stock dividend when the Stock Dividends Declared account is closed to Retained Earnings at the end of the accounting period. Common Stock Distributable is credited for the par value of the stock to be distributed ($3,000 \times \$5 = \$15,000$).

In addition, when the market value is greater than the par value of the stock, Paid-in Capital in Excess of Par Value, Common must be credited for the amount by which the market value exceeds the par value. In this case, the total market value of the stock dividend (\$60,000) exceeds the total par value (\$15,000) by \$45,000. No entry is required on the date of record. On the distribution date, the common stock is issued by debiting Common Stock Distributable and crediting Common Stock for the par value of the stock (\$15,000).

Common Stock Distributable is not a liability account because there is no obligation to distribute cash or other assets. The obligation is to distribute additional shares of capital stock. If financial statements are prepared between the date of declaration and the date of distribution, Common Stock Distributable should be reported as part of contributed capital:

Contributed Capital

Common Stock, \$5 par value, 100,000 shares authorized, 30,000 shares issued and outstanding	\$ 150,000
Common Stock Distributable, 3,000 shares	15,000
Paid-in Capital in Excess of Par Value, Common	75,000
Total Contributed Capital	\$ 240,000
Retained Earnings	840,000
Total Stockholders' Equity	<u>\$1,080,000</u>

Three points can be made from this example. First, the total stockholders' equity is the same before and after the stock dividend. Second, the assets of the corporation are not reduced as in the case of a cash dividend. Third, the proportionate ownership in the corporation of any individual stockholder is the same before and after the stock dividend. To illustrate these points, assume that a stockholder owns 1,000 shares before the stock dividend. After the 10 percent stock dividend is distributed, this stockholder would own 1,100 shares, as illustrated below.

Stockholders' Equity	Before Dividend	After Dividend
Common Stock	\$ 150,000	\$ 165,000
Paid-in Capital in Excess of Par Value, Common	30,000	75,000
Total Contributed Capital	\$ 180,000	\$ 240,000
Retained Earnings	900,000	840,000
Total Stockholders' Equity	<u>\$1,080,000</u>	<u>\$1,080,000</u>
Shares Outstanding	<u>30,000</u>	<u>33,000</u>
Stockholders' Equity per Share	<u>\$ 36.00</u>	<u>\$ 32.73</u>

Stockholders' Investment

Shares owned	1,000	1,100
Shares outstanding	30,000	33,000
Percentage of ownership	3⅓%	3⅓%
Proportionate investment ($\$1,080,000 \times .03\frac{1}{3}$)	\$36,000	\$36,000

Both before and after the stock dividend, the stockholders' equity totals \$1,080,000 and the stockholder owns 3⅓ percent of the company. The proportionate investment (stockholders' equity times percentage ownership) remains at \$36,000.

All stock dividends have an effect on the market price of a company's stock. But some stock dividends are so large that they have a material effect. For example, a 50 percent stock dividend would cause the market price of the stock to drop about 33 percent because the increase is now one-third of shares outstanding. The AICPA has decided that large stock dividends, those greater than 20 to 25 percent, should be accounted for by transferring the par or stated value of the stock on the date of declaration from retained earnings to contributed capital.²²

Stock Splits

A **stock split** occurs when a corporation increases the number of issued shares of stock and reduces the par or stated value proportionally. A company may plan a stock split when it wants to lower the stock's market value per share and increase the demand for the stock at this lower price. This action may be necessary if the market value per share has become so high that it hinders the trading of the stock



or if the company wants to signal to the market its success in achieving its operating goals. For example, the action of The Gillette Company in a recent year in declaring a 2-for-1 stock split and raising its cash dividend achieved these strategic objectives. These actions were viewed positively by the market by pushing the share price to \$106 from an earlier share price of \$77. After the stock split, the number of shares outstanding doubled, thereby cutting the share price in half and also the dividend per share. Most important, each stockholder's total wealth is unchanged as a result of the stock split.

To illustrate a stock split, suppose that Caprock Corporation has 30,000 shares of \$5.00 par value stock outstanding. The market value is \$70.00 per share. The corporation plans a 2-for-1 split. This split will lower the par value to \$2.50 and increase the number of shares outstanding to 60,000. A stockholder who previously owned 400 shares of the \$5.00 par stock would own 800 shares of the \$2.50 par stock after the split. When a stock split occurs, the market value tends to fall in proportion to the increase in outstanding shares of stock. For example, a 2-for-1 stock split would cause the price of the stock to drop by approximately 50 percent, to about \$35.00. It would also halve earnings per share and cash dividends per share (if the board does not increase the dividend). The lower price and the increase in shares tend to promote the buying and selling of shares.

A stock split does not increase the number of shares authorized. Nor does it change the balances in the stockholders' equity section of the balance sheet. It simply changes the par value and the number of shares issued, both shares outstanding and shares held as treasury stock. Therefore, an entry is not necessary. However, it is appropriate to document the change by making a memorandum entry in the general journal.

July 15 The 30,000 shares of \$5 par value common stock that are issued and outstanding were split 2 for 1, resulting in 60,000 shares of \$2.50 par value common stock issued and outstanding.

The change for the Caprock Corporation is as follows:

Before Stock Split (from page 642)

Contributed Capital	
Common Stock, \$5 par value, 100,000 shares authorized, 30,000 shares issued and outstanding	\$ 150,000
Paid-in Capital in Excess of Par Value, Common	30,000
Total Contributed Capital	<u>\$ 180,000</u>
Retained Earnings	900,000
Total Stockholders' Equity	<u><u>\$1,080,000</u></u>

After Stock Split

Contributed Capital	
Common Stock, \$2.50 par value, 100,000 shares authorized, 60,000 shares issued and outstanding	\$ 150,000
Paid-in Capital in Excess of Par Value, Common	30,000
Total Contributed Capital	<u>\$ 180,000</u>
Retained Earnings	900,000
Total Stockholders' Equity	<u><u>\$1,080,000</u></u>

Although the amount of stockholders' equity per share would be half as much, each stockholder's proportionate interest in the company would remain the same.

If the number of split shares will exceed the number of authorized shares, the board of directors must secure state and stockholders' approval before it can issue additional shares.

Book Value

OBJECTIVE

8 Calculate book value per share

The word *value* is associated with shares of stock in several ways. Par value or stated value is set when the stock is authorized and establishes the legal capital of a company. Neither par value nor stated value has any relationship to a stock's book value or market value. The **book value** of a company's stock represents the total assets of the company less its liabilities. It is simply the stockholders' equity of the company or, to look at it another way, the company's net assets. The **book value per share**, therefore, represents the equity of the owner of one share of stock in the net assets of the corporation. That value, of course, does not necessarily equal the amount the shareholder would receive if the company were sold or liquidated. It differs in most cases because assets are usually recorded at historical cost, not at the current value at which they could be sold.

To determine the book value per share when a company has only common stock outstanding, divide the total stockholders' equity by the total common shares outstanding. In computing the shares outstanding, common stock distributable is included. Treasury stock (shares previously issued and now held by the company), however, is not included. For example, suppose that Caprock Corporation has total stockholders' equity of \$1,030,000 and 29,000 shares outstanding after recording the purchase of treasury shares. The book value per share of Caprock's common stock is \$35.52 ($\$1,030,000 \div 29,000$ shares).

If a company has both preferred and common stock, the determination of book value per share is not so simple. The general rule is that the call value (or par value, if a call value is not specified) of the preferred stock plus any dividends in arrears is subtracted from total stockholders' equity to determine the equity pertaining to common stock. As an illustration, refer to the stockholders' equity section of Tri-State Corporation's balance sheet in Exhibit 3. Assuming that there are no dividends in arrears and that the preferred stock is callable at \$105, the equity pertaining to common stock is calculated as follows:

Total stockholders' equity	\$2,014,400
Less equity allocated to preferred shareholders (3,000 shares \times \$105)	315,000
Equity pertaining to common shareholders	<u>\$1,699,400</u>

There are 41,300 shares of common stock outstanding (41,800 shares issued less 500 shares of treasury stock). The book values per share are computed as follows:

$$\begin{aligned}\text{Preferred Stock: } & \$315,000 \div 3,000 \text{ shares} = \$105 \text{ per share} \\ \text{Common Stock: } & \$1,699,400 \div 41,300 \text{ shares} = \$41.15 \text{ per share}\end{aligned}$$

If we assume the same facts except that the preferred stock is 8 percent cumulative and that one year of dividends is in arrears, the stockholders' equity would be allocated as follows:

Total stockholders' equity	\$2,014,400
Less: Call value of outstanding preferred shares	\$315,000
Dividends in arrears ($\$300,000 \times .08$)	<u>24,000</u>
Equity allocated to preferred shareholders	339,000
Equity pertaining to common shareholders	<u>\$1,675,400</u>

The book values per share are then as follows:

$$\begin{aligned}\text{Preferred Stock: } & \$339,000 \div 3,000 \text{ shares} = \$113 \text{ per share} \\ \text{Common Stock: } & \$1,675,400 \div 41,300 \text{ shares} = \$40.57 \text{ per share}\end{aligned}$$

Undeclared preferred dividends fall into arrears on the last day of the fiscal year (the date shown on the financial statements). Also, dividends in arrears do not apply to unissued preferred stock.

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

- 1. Identify the issues related to evaluating the quality of a company's earnings.** Current and prospective net income is an important component in many ratios used to evaluate a company. The user should recognize that the quality of reported net income can be influenced by certain choices made by management. First, management exercises judgment in choosing the accounting methods and estimates that are used in computing net income. Second, discontinued operations, extraordinary gains or losses, and changes in accounting methods may affect net income positively or negatively.
- 2. Prepare a corporate income statement.** The corporate income statement shows comprehensive income—all revenues, expenses, gains, and losses for the accounting period, except for prior period adjustments. The top part of the corporate income statement includes all revenues, costs and expenses, and income taxes that pertain to continuing operations. The bottom part of the statement contains any or all of the following: discontinued operations, extraordinary items, and accounting changes. Earnings per share data should be shown at the bottom of the statement, below net income.
- 3. Show the relationships among income taxes expense, deferred income taxes, and net of taxes.** Income taxes expense is the taxes applicable to income from operations on an accrual basis. Income tax allocation is necessary when differences between accrual-based accounting income and taxable income cause a material difference between income taxes expense as shown on the income statement and actual income tax liability. The difference between income taxes expense and income taxes payable is debited or credited to an account called Deferred Income Taxes. *Net of taxes* is a phrase used to indicate that the effect of taxes has been considered when showing an item on the income statement.
- 4. Describe the disclosure on the income statement of discontinued operations, extraordinary items, and accounting changes.** Because of their unusual nature, a gain or loss on discontinued operations and on extraordinary items, and the cumulative effect of accounting changes must be disclosed on the income statement separately from continuing operations and net of income taxes. Relevant information about any accounting change is shown in the notes to the financial statements.
- 5. Compute earnings per share.** Stockholders and other readers of financial statements use earnings per share data to evaluate a company's performance and to compare it with the performance of other companies. Therefore, earnings per share data are presented on the face of the income statement. The amounts are computed by dividing the income applicable to common stock by the number of common shares outstanding for the year. If the number of shares outstanding has varied during the year, then the weighted-average number of common shares outstanding should be used in the computation. When the company has a complex capital structure, both basic and diluted earnings per share must be disclosed on the face of the income statement.

6. Prepare a statement of stockholders' equity. A statement of stockholders' equity shows changes over the period in each component of the stockholders' equity section of the balance sheet. This statement reveals much more about the transactions that affect stockholders' equity than does the statement of retained earnings.

7. Account for stock dividends and stock splits. A stock dividend is a proportional distribution of shares of a corporation's stock to the company's stockholders. Here is a summary of the key dates and accounting treatment of stock dividends.

Key Date	Stock Dividend
Date of declaration	Debit Stock Dividends Declared for the market value of the stock to be distributed (if it is a small stock dividend), and credit Common Stock Distributable for the stock's par value and Paid-in Capital in Excess of Par Value, Common for the excess of the market value over the stock's par value.
Date of record	No entry.
Date of distribution	Debit Common Stock Distributable and credit Common Stock for the par value of the stock that has been distributed.

A stock split is usually undertaken to reduce the market value of a company's stock and improve the demand for the stock. Because there is normally a decrease in the par value of the stock in proportion to the number of additional shares issued, a stock split has no effect on the dollar amounts in the stockholders' equity accounts. The split should be recorded in the general journal by a memorandum entry only.

8. Calculate book value per share. Book value per share is the stockholders' equity per share. It is calculated by dividing stockholders' equity by the number of common shares outstanding plus shares distributable. When a company has both preferred and common stock, the call or par value of the preferred stock plus any dividends in arrears is deducted from total stockholders' equity before dividing by the common shares outstanding.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- L0 5 Basic earnings per share:** The net income applicable to common stock divided by the weighted-average number of common shares outstanding.
- L0 0 Book value:** The total assets of a company less its liabilities; stockholders' equity.
- L0 8 Book value per share:** The equity of the owner of one share of stock in the net assets of the corporation.
- L0 5 Complex capital structure:** A capital structure that includes convertible preferred stocks or bonds, or stock options that can be converted into common stock.
- L0 2 Comprehensive income:** The change in a company's equity during a period from sources other than owners; it includes net income, changes in unrealized investment gains and losses, and other items affecting equity.
- L0 4 Cumulative effect of an accounting change:** The effect that a different accounting principle would have had on the net income of prior periods if it had been used instead of the old principle.
- L0 3 Deferred Income Taxes:** The account used to record the difference between the Income Taxes Expense and Income Taxes Payable accounts.
- L0 6 Deficit:** A debit balance in the Retained Earnings account.

- L05 Diluted earnings per share:** The net income applicable to common stock divided by the sum of the weighted-average number of common shares outstanding plus potentially dilutive securities.
- L04 Discontinued operations:** Segments of a business that are no longer part of its ongoing operations.
- L04 Extraordinary items:** Events or transactions that are both unusual in nature and infrequent in occurrence.
- L03 Income tax allocation:** An accounting method used to accrue income taxes expense on the basis of accounting income whenever there are differences between accounting and taxable income.
- L03 Net of taxes:** Taking into account the effect of applicable taxes (most often, income taxes) on an item to determine the overall effect of the item on the income statement.
- L05 Potentially dilutive securities:** Stock options and convertible preferred stocks or bonds, which have the potential to dilute earnings per share.
- L01 Quality of earnings:** The substance of earnings and their sustainability into future accounting periods.
- L06 Restriction on retained earnings:** The required or voluntary identification of a portion of retained earnings that cannot be used to declare dividends.
- L06 Retained earnings:** Stockholders' claims to assets arising from the earnings of the business; the accumulated earnings of a corporation from its inception, minus any losses, dividends, or transfers to contributed capital.
- L04 Segments:** Distinct parts of business operations, such as lines of business or classes of customer.
- L05 Simple capital structure:** A capital structure in which there are no stocks, bonds, or stock options that can be converted into common stock.
- L06 Statement of stockholders' equity:** A financial statement that summarizes changes in the components of the stockholders' equity section of the balance sheet; also called *statement of changes in stockholders' equity*.
- L07 Stock dividend:** A proportional distribution of shares of a corporation's stock to its stockholders.
- L07 Stock split:** An increase in the number of outstanding shares of stock accompanied by a proportionate reduction in the par or stated value.

REVIEW PROBLEM

Comprehensive Stockholders' Equity Transactions

- L06** The stockholders' equity of the Szatkowski Company on June 30, 20x1, is shown below.

L07

L08

Contributed Capital

Common Stock, no par value, \$6 stated value, 1,000,000 shares authorized, 250,000 shares issued and outstanding	\$1,500,000
Paid-in Capital in Excess of Stated Value, Common	820,000
Total Contributed Capital	\$2,320,000
Retained Earnings	970,000
Total Stockholders' Equity	<u>\$3,290,000</u>

Stockholders' equity transactions for the next fiscal year were as follows:

- The board of directors declared a 2-for-1 stock split.
- The board of directors obtained authorization to issue 50,000 shares of \$100 par value, 6 percent noncumulative preferred stock, callable at \$104.
- Issued 12,000 shares of common stock for a building appraised at \$96,000.
- Purchased 8,000 shares of the company's common stock for \$64,000.

- e. Issued 20,000 shares of preferred stock for \$100 per share.
- f. Sold 5,000 shares of treasury stock for \$35,000.
- g. Declared cash dividends of \$6 per share on preferred stock and \$.20 per share on common stock.
- h. Date of record.
- i. Paid the preferred and common stock cash dividends.
- j. Declared a 10 percent stock dividend on common stock. The market value was \$10 per share. The stock dividend is distributable after the end of the fiscal year.
- k. Closed Net Income for the year, \$340,000.
- l. Closed the Cash Dividends Declared and Stock Dividends Declared accounts to Retained Earnings.

Because of a loan agreement, the company is not allowed to reduce retained earnings below \$100,000. The board of directors determined that this restriction should be disclosed in the notes to the financial statements.

REQUIRED

1. Record the preceding transactions in journal form.
2. Prepare the stockholders' equity section of the company's balance sheet on June 30, 20x2, including appropriate disclosure of the restriction on retained earnings.
3. Compute the book values per share of common stock on June 30, 20x1 and 20x2, and of preferred stock on June 30, 20x2, using end-of-year shares outstanding.

ANSWER TO REVIEW PROBLEM

1. Prepare the entries in journal form.
 - a. Memorandum entry: 2-for-1 stock split, common, resulting in 500,000 shares issued and outstanding of no par value common stock with a stated value of \$3
 - b. No entry required.
 - c.

Building	96,000	
Common Stock		36,000
Paid-in Capital in Excess of Stated Value, Common		60,000
Issued 12,000 shares of common stock for a building appraised at \$96,000		
 - d.

Treasury Stock, Common	64,000	
Cash		64,000
Purchased 8,000 shares of common stock for the treasury for \$8 per share		
 - e.

Cash	2,000,000	
Preferred Stock		2,000,000
Issued 20,000 shares of \$100 par value preferred stock at \$100 per share		
 - f.

Cash	35,000	
Retained Earnings	5,000	
Treasury Stock, Common		40,000
Sold 5,000 shares of treasury stock for \$35,000, originally purchased for \$8 per share		
 - g.

Cash Dividends Declared	221,800	
Cash Dividends Payable		221,800
Declared cash dividends of \$6 per share on 20,000 shares of preferred stock and \$.20 per share on 509,000 shares of common stock:		
20,000 × \$6	= \$120,000	
509,000 × \$.20	= 101,800	
	<u>\$221,800</u>	

- h. No entry required.
- i. Cash Dividends Payable 221,800
 Cash 221,800
 Paid cash dividends to preferred and common stockholders
- j. Stock Dividends Declared 509,000
 Common Stock Distributable 152,700
 Paid-in Capital in Excess of Stated Value, Common 356,300
 Declared a 50,900-share stock dividend ($509,000 \times .10$) on \$3 stated value common stock at a market value of \$509,000 ($50,900 \times \10)
- k. Income Summary 340,000
 Retained Earnings 340,000
 Closed the Income Summary account to Retained Earnings
- l. Retained Earnings 730,800
 Cash Dividends Declared 221,800
 Stock Dividends Declared 509,000
 Closed the Cash Dividends Declared and Stock Dividends Declared accounts to Retained Earnings
2. Prepare the stockholders' equity section of the balance sheet.

Szatkowski Company Stockholders' Equity June 30, 20x2			
Contributed Capital			
Preferred Stock, \$100 par value, 6 percent noncumulative, 50,000 shares authorized, 20,000 shares issued and outstanding			\$2,000,000
Common Stock, no par value, \$3 stated value, 1,000,000 shares authorized, 512,000 shares issued, 509,000 shares outstanding	\$1,536,000		
Common Stock Distributable, 50,900 shares	152,700		
Paid-in Capital in Excess of Stated Value, Common	1,236,300	2,925,000	
Total Contributed Capital			\$4,925,000
Retained Earnings (Note x)			574,200
Total Contributed Capital and Retained Earnings			\$5,499,200
Less Treasury Stock, Common (3,000 shares, at cost)			24,000
Total Stockholders' Equity			<u>\$5,475,200</u>

Note x: The board of directors has restricted retained earnings available for dividends by the amount of \$100,000 as required under a loan agreement.

3. Compute the book values.

June 30, 20x1

Common Stock: $\$3,290,000 \div 250,000 \text{ shares} = \13.16 per share

June 30, 20x2

Preferred Stock: Call price of \$104 per share equals book value per share

Common Stock:

$(\$5,475,200 - \$2,080,000) \div (509,000 \text{ shares} + 50,900 \text{ shares}) =$
 $\$3,395,200 \div 559,900 \text{ shares} = \6.06 per share

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. What is quality of earnings, and what are two ways in which quality of earnings may be affected?
2. Why would the reader of financial statements be interested in management's choice of accounting methods and estimates? Give an example.
3. What is comprehensive income? How does comprehensive income differ from net income?
4. In the first quarter of 1994, AT&T, the giant telecommunications company, reported a net loss because it reduced its income by \$1.3 billion, or \$.96 per share, as a result of changing its method of accounting for disability and severance payments. Without this charge, the company would have earned \$1.15 billion, or \$.85 per share. Where on the corporate income statement do you find the effects of changes in accounting principles? As an analyst, how would you treat this accounting change?
5. "Accounting income should be geared to the concept of taxable income because the public understands that concept." Comment on this statement, and tell why income tax allocation is necessary.
6. Nabisco had about \$1.3 billion of deferred income taxes in 1996, equal to about 11 percent of total liabilities. This percentage has risen or remained steady for many years. Given management's desire to put off the payment of taxes as long as possible, the long-term growth of the economy and inflation, and the definition of a liability (probable future sacrifice of economic benefits arising from present obligations), make an argument for not accounting for deferred income taxes.
7. Why should a gain or loss on discontinued operations be disclosed separately on the income statement?
8. Explain the two major criteria for extraordinary items. How should extraordinary items be disclosed in the financial statements?
9. When an accounting change occurs, what disclosures must be made in the financial statements?
10. How are earnings per share disclosed in the financial statements?
11. When does a company have a simple capital structure? A complex capital structure?
12. What is the difference between basic and diluted earnings per share?
13. What is the difference between the statement of stockholders' equity and the stockholders' equity section of the balance sheet?
14. When does a company have a deficit in retained earnings?
15. What is the purpose of a restriction on retained earnings and why might a company have restrictions on its retained earnings?
16. Explain how the accounting treatment of stock dividends differs from that of cash dividends.
17. What is the difference between a stock dividend and a stock split? What is the effect of each on the capital structure of the corporation?
18. Would you expect a corporation's book value per share to equal its market value per share? Why or why not?

SHORT EXERCISES

- SE 1.** Each of the items at the top of the next page is a quality of earnings issue. Indicate whether the item is (a) an accounting method, (b) an accounting estimate, or (c) a nonoperating item. For any item for which the answer is (a) or (b), indicate which alternative is usually the more conservative choice.

1. LIFO versus FIFO
2. Extraordinary loss
3. Ten-year useful life versus 15-year useful life
4. Effect of change in accounting principle
5. Straight-line versus accelerated method
6. Discontinued operations
7. Immediate write-off versus amortization
8. Increase in percentage of uncollectible accounts versus a decrease

SE 2.**LO 2 Corporate Income Statement**

Assume that Griswold Company's chief financial officer gave you the following information: Net Sales, \$720,000; Cost of Goods Sold, \$350,000; Loss from Discontinued Operations (net of income tax benefit of \$70,000), \$200,000; Loss on Disposal of Discontinued Operations (net of income tax benefit of \$16,000), \$50,000; Operating Expenses, \$130,000; Income Taxes Expense on Continuing Operations, \$100,000. From this information, prepare the company's income statement for the year ended June 30, 20xx. (Ignore earnings per share information.)

SE 3.**LO 3 Use of Corporate Income Tax Rate Schedule**

Using the corporate tax rate schedule in Table 1, compute the income tax liability for taxable income of (1) \$400,000 and (2) \$20,000,000.

SE 4.**LO 5 Earnings per Share**

During 20x1, Jimmo Corporation reported a net income of \$669,200. On January 1, Jimmo had 360,000 shares of common stock outstanding. The company issued an additional 240,000 shares of common stock on August 1. In 20x1, the company had a simple capital structure. During 20x2, there were no transactions involving common stock, and the company reported net income of \$870,000. Determine the weighted-average number of common shares outstanding for 20x1 and 20x2. Also, compute earnings per share for 20x1 and 20x2.

SE 5.**LO 6 Statement of Stockholders' Equity**

Refer to the statement of stockholders' equity for Tri-State Corporation in Exhibit 2 to answer the following questions: (1) At what price per share were the 5,000 shares of common stock sold? (2) What was the conversion price per share of the common stock? (3) At what price was the common stock selling on the date of the stock dividend? (4) At what price per share was the treasury stock purchased?

SE 6.**LO 6 Effects of Stockholders' Equity Actions**

Tell whether each of the following actions will increase, decrease, or have no effect on total assets, total liabilities, and total stockholders' equity.

1. Declaration of a stock dividend
2. Declaration of a cash dividend
3. Stock split
4. Restriction of retained earnings
5. Purchase of treasury stock

SE 7.**LO 6 Restriction of Retained Earnings**

Swift Company has a lawsuit filed against it. The board took action to restrict retained earnings in the amount of \$2,500,000 on May 31, 20x1, pending the outcome of the suit. On May 31, the company had retained earnings of \$3,725,000. Show how the restriction on retained earnings would be disclosed as a note to the financial statements.

SE 8.**LO 7 Stock Dividends**

On February 15, Green Mountain Corporation's board of directors declared a 2 percent stock dividend applicable to the outstanding shares of its \$10 par value common stock, of which 200,000 shares are authorized, 130,000 are issued, and 20,000 are held in the treasury. The stock dividend was distributable on March 15 to stockholders of record on March 1. On February 15, the market value of the common stock was \$15 per share. On March 30, the board of directors declared a \$.50 per share cash dividend. No other stock transactions have occurred. Record the necessary transactions on February 15, March 1, March 15, and March 30.

SE 9.**LO 7 Stock Split**

On August 10, the board of directors of Symula International declared a 3-for-1 stock split of its \$9 par value common stock, of which 800,000 shares were authorized and 250,000 were issued and outstanding. The market value on that date was \$60 per share. On the same date, the balance of Paid-in Capital in Excess of Par Value, Common was \$6,000,000, and the balance of Retained Earnings was \$6,500,000. Prepare the stockholders' equity section of the company's balance sheet after the stock split. What journal entry, if any, is needed to record the stock split?

LO 8 Book Value for Preferred and Common Stock

SE 10. Given the stockholders' equity section of the Talmage Corporation's balance sheet shown below, what is the book value per share for both the preferred and the common stock?

Contributed Capital		
Preferred Stock, \$100 par value, 8 percent cumulative, 10,000 shares authorized, 500 shares issued and outstanding*		\$ 50,000
Common Stock, \$10 par value, 100,000 shares authorized, 40,000 shares issued and outstanding	\$400,000	
Paid-in Capital in Excess of Par Value, Common	<u>516,000</u>	916,000
Total Contributed Capital		\$ 966,000
Retained Earnings		<u>275,000</u>
Total Stockholders' Equity		<u>\$1,241,000</u>

*The preferred stock is callable at \$104 per share, and one year's dividends are in arrears.

EXERCISES**LO 1 Effect of Alternative Accounting Methods**

- E 1.** At the end of its first year of operations, a company calculated its ending merchandise inventory according to three different accounting methods, as follows: FIFO, \$95,000; average-cost, \$90,000; LIFO, \$86,000. If the average-cost method is used by the company, net income for the year would be \$34,000.
1. Determine net income if the FIFO method is used.
 2. Determine net income if the LIFO method is used.
 3. Which method is more conservative?
 4. Will the consistency convention be violated if the company chooses to use the LIFO method?
 5. Does the full-disclosure convention require disclosure of the inventory method selected by management in the financial statements?

LO 2 Corporate Income Statement

- E 2.** Assume that the Abbey Furniture Company's chief financial officer gave you the following information: Net Sales, \$1,900,000; Cost of Goods Sold, \$1,050,000; Extraordinary Gain (net of income taxes of \$3,500), \$12,500; Loss from Discontinued Operations (net of income tax benefit of \$30,000), \$50,000; Loss on Disposal of Discontinued Operations (net of income tax benefit of \$13,000), \$35,000; Selling Expenses, \$50,000; Administrative Expenses, \$40,000; Income Taxes Expense on Continuing Operations, \$300,000.

From this information, prepare the company's income statement for the year ended June 30, 20xx. (Ignore earnings per share information.)

LO 2 Corporate Income
LO 3 Statement
LO 4
LO 5

- E 3.** The following items are components on the income statement of Burda Corporation for the year ended December 31, 20x1:

Sales	\$500,000
Cost of Goods Sold	(275,000)
Operating Expenses	(112,500)
Total Income Taxes Expense for Period	(82,350)
Income from Operations of a Discontinued Segment	80,000
Gain on Disposal of Segment	70,000
Extraordinary Gain on Retirement of Bonds	36,000
Cumulative Effect of a Change in Accounting Principle	<u>(24,000)</u>
Net Income	<u>\$192,150</u>
Earnings per share	<u>\$.96</u>

Recast the 20x1 income statement in proper multistep form, including allocating income taxes to appropriate items (assume a 30 percent income tax rate) and showing earnings per share figures (200,000 shares outstanding).

LO 3 Use of Corporate Income Tax Rate Schedule

- E 4.** Using the corporate tax rate schedule in Table 1, compute the income tax liability for the following situations:

Situation	Taxable Income
A	\$ 70,000
B	85,000
C	320,000

LO 3 Income Tax Allocation

- E 5.** The Cohn Corporation reported the following accounting income before income taxes, income taxes expense, and net income for 20x2 and 20x3:

	20x2	20x3
Income before income taxes	\$280,000	\$280,000
Income taxes expense	<u>88,300</u>	<u>88,300</u>
Net income	<u>\$191,700</u>	<u>\$191,700</u>

Also, on the balance sheet, deferred income taxes liability increased by \$38,400 in 20x2 and decreased by \$18,800 in 20x3.

- How much did Cohn Corporation actually pay in income taxes for 20x2 and 20x3?
- Prepare entries in journal form to record income taxes expense for 20x2 and 20x3.

LO 5 Earnings per Share

- E 6.** During 20x1, the De La Haza Corporation reported a net income of \$1,529,500. On January 1, De La Haza had 700,000 shares of common stock outstanding. The company issued an additional 420,000 shares of common stock on October 1. In 20x1, the company had a simple capital structure. During 20x2, there were no transactions involving common stock, and the company reported net income of \$2,016,000.

- Determine the weighted-average number of common shares outstanding each year.
- Compute earnings per share for each year.

LO 6 Restriction of Retained Earnings

- E 7.** The board of directors of the Edelen Company has approved plans to acquire another company during the coming year. The acquisition should cost approximately \$550,000. The board took action to restrict retained earnings of the company in the amount of \$550,000 on July 17, 20x1. On July 31, the company had retained earnings of \$975,000. Show how the restriction on retained earnings can be disclosed as a note to the financial statements.

LO 6 Statement of Stockholders' Equity

- E 8.** The stockholders' equity section of Farhad Corporation's balance sheet on December 31, 20x2, appears as follows:

Contributed Capital	
Common Stock, \$2 par value, 500,000 shares authorized, 400,000 shares issued and outstanding	\$ 800,000
Paid-in Capital in Excess of Par Value, Common	<u>1,200,000</u>
Total Contributed Capital	\$2,000,000
Retained Earnings	<u>4,200,000</u>
Total Stockholders' Equity	<u>\$6,200,000</u>

Prepare a statement of stockholders' equity for the year ended December 31, 20x3, assuming the following transactions occurred in sequence during 20x3:

- Issued 10,000 shares of \$100 par value, 9 percent cumulative preferred stock at par after obtaining authorization from the state.
- Issued 40,000 shares of common stock in connection with the conversion of bonds having a carrying value of \$600,000.
- Declared and issued a 2 percent common stock dividend. The market value on the date of declaration was \$14 per share.
- Purchased 10,000 shares of common stock for the treasury at a cost of \$16 per share.
- Earned net income of \$460,000.
- Declared and paid the full year's dividend on preferred stock and a dividend of \$.40 per share on common stock outstanding at the end of the year.

LO 7 Journal Entries: Stock Dividends

E 9. The Garonski Company has 30,000 shares of its \$1 par value common stock outstanding. Record the following transactions as they relate to the company's common stock:

- July 17 Declared a 10 percent stock dividend on common stock to be distributed on August 10 to stockholders of record on July 31. Market value of the stock was \$5 per share on this date.
 31 Record date.
 Aug. 10 Distributed the stock dividend declared on July 17.
 Sept. 1 Declared a \$.50 per share cash dividend on common stock to be paid on September 16 to stockholders of record on September 10.

LO 7 Stock Split

E 10. The Hao Company currently has 500,000 shares of \$1 par value common stock authorized with 200,000 shares outstanding. The board of directors declared a 2-for-1 split on May 15, when the market value of the common stock was \$2.50 per share. The Retained Earnings balance on May 15 was \$700,000. Paid-in Capital in Excess of Par Value, Common on this date was \$20,000.

Prepare the stockholders' equity section of the company's balance sheet before and after the stock split. What entry, if any, would be necessary to record the stock split?

LO 7 Stock Split

E 11. On January 15, the board of directors of Imhoff International declared a 3-for-1 stock split of its \$12 par value common stock, of which 800,000 shares were authorized and 200,000 were issued and outstanding. The market value on that date was \$45 per share. On the same date, the balance of Paid-in Capital in Excess of Par Value, Common was \$4,000,000, and the balance of Retained Earnings was \$8,000,000.

Prepare the stockholders' equity section of the company's balance sheet before and after the stock split. What entry, if any, is needed to record the stock split?

LO 8 Book Value for Preferred and Common Stock

E 12. Below is the stockholders' equity section of the Tri-Town Corporation's balance sheet. Determine the book value per share for both the preferred and the common stock.

Contributed Capital		
Preferred Stock, \$100 per share, 6 percent cumulative, 10,000 shares authorized, 200 shares issued and outstanding*		\$ 20,000
Common Stock, \$5 par value, 100,000 shares authorized, 10,000 shares issued, 9,000 shares outstanding	\$50,000	
Paid-in Capital in Excess of Par Value, Common	28,000	78,000
Total Contributed Capital		\$ 98,000
Retained Earnings		95,000
Total Contributed Capital and Retained Earnings		\$193,000
Less Treasury Stock, Common (1,000 shares at cost)		15,000
Total Stockholders' Equity		<u>\$178,000</u>

*The preferred stock is callable at \$105 per share, and one year's dividends are in arrears.

PROBLEMS**LO 1 Effect of Alternative Accounting Methods**

P 1. Zalme Company began operations this year. At the beginning of 20xx, the company purchased plant assets of \$900,000, with an estimated useful life of ten years and no salvage value. During the year, the company had net sales of \$1,300,000, salaries expense of \$200,000, and other expenses of \$80,000, excluding depreciation. In addition, Zalme Company purchased inventory as follows:

Jan. 15	400 units at \$400	\$160,000
Mar. 20	200 units at \$408	81,600
June 15	800 units at \$416	332,800
Sept. 18	600 units at \$412	247,200
Dec. 9	300 units at \$420	126,000
Total	<u>2,300 units</u>	<u>\$947,600</u>

At the end of the year, a physical inventory disclosed 500 units still on hand. The managers of Zalme Company know they have a choice of accounting methods, but are

REQUIRED

unsure how those methods will affect net income. They have heard of the FIFO and LIFO inventory methods and the straight-line and double-declining-balance depreciation methods. Ignore income taxes.

1. Prepare two income statements for Zalme Company, one using the FIFO and straight-line methods, the other using the LIFO and double-declining-balance methods.
2. Prepare a schedule accounting for the difference in the two net income figures obtained in 1.
3. What effect does the choice of accounting method have on Zalme's inventory turnover? What conclusions can you draw?
4. How does the choice of accounting methods affect Zalme's return on assets? Assume the company's only assets are cash of \$80,000, inventory, and plant assets. Use year-end balances to compute the ratios. Is your evaluation of Zalme's profitability affected by the choice of accounting methods?

P 2. Information concerning operations of the Norris Weather Gear Corporation during 20xx is as follows:

- a. Administrative expenses, \$180,000.
- b. Cost of goods sold, \$840,000.
- c. Cumulative effect of an accounting change in depreciation methods that increased income (net of taxes, \$40,000), \$84,000.
- d. Extraordinary loss from an earthquake (net of taxes, \$72,000), \$120,000.
- e. Sales (net), \$1,800,000.
- f. Selling expenses, \$160,000.
- g. Income taxes expense applicable to continuing operations, \$210,000.

Prepare the corporation's income statement for the year ended December 31, 20xx, including earnings per share information. Assume a weighted average of 100,000 common shares outstanding during the year.

P 3. During 20x3 Dasbol Corporation engaged in a number of complex transactions to restructure the business—selling off a division, retiring bonds, and changing accounting methods. The company has always issued a simple single-step income statement, and the accountant has accordingly prepared the December 31 year-end income statements for 20x2 and 20x3, as shown below.

Dasbol Corporation
Income Statements
For the Years Ended December 31, 20x3 and 20x2

	20x3	20x2
Net Sales	\$1,000,000	\$1,200,000
Cost of Goods Sold	(550,000)	(600,000)
Operating Expenses	(225,000)	(150,000)
Income Taxes Expense	(164,700)	(135,000)
Income from Operations of a		
Discontinued Segment	160,000	
Gain on Disposal of Discontinued Segment	140,000	
Extraordinary Gain on Retirement of Bonds	72,000	
Cumulative Effect of a Change in		
Accounting Principle	(48,000)	
Net Income	<u>\$ 384,300</u>	<u>\$ 315,000</u>
Earnings per share	<u>\$ 1.92</u>	<u>\$ 1.58</u>

The president of the company, Joseph Dasbol, is pleased to see that both net income and earnings per share increased by 22 percent from 20x2 to 20x3 and intends to announce to the stockholders that the restructuring is a success.

LO 2 Corporate Income
LO 3 Statement

LO 4

LO 5



REQUIRED

LO 2 Corporate Income
LO 3 Statement and

LO 4 Evaluation of

LO 5 Business Operations



REQUIRED

- Recast the 20x3 and 20x2 income statements in proper multistep form, including allocating income taxes to appropriate items (assume a 30 percent income tax rate) and showing earnings per share figures (200,000 shares outstanding).
- What is your assessment of Dasbol Corporation's restructuring plan and business operations in 20x3?

- P 4.** The stockholders' equity section of the balance sheet of Pittman Corporation as of December 31, 20x4, was as follows:

Contributed Capital	
Common Stock, \$4 par value, 500,000 shares authorized, 200,000 shares issued and outstanding	\$ 800,000
Paid-in Capital in Excess of Par Value, Common	1,000,000
Total Contributed Capital	<u>\$1,800,000</u>
Retained Earnings	1,200,000
Total Stockholders' Equity	<u><u>\$3,000,000</u></u>

The following transactions occurred in 20x5 for Pittman Corporation:

- Feb. 28 The board of directors declared a 10 percent stock dividend to stockholders of record on March 25 to be distributed on April 5. The market value on this date is \$16.
- Mar. 25 Date of record for stock dividend.
- Apr. 5 Issued stock dividend.
- Aug. 3 Declared a 2-for-1 stock split.
- Nov. 20 Purchased 18,000 shares of the company's common stock at \$8 per share for the treasury.
- Dec. 31 Declared a 5 percent stock dividend to stockholders of record on January 25 to be distributed on February 5. The market value per share was \$9.

REQUIRED

- Record the transactions for Pittman Corporation in T accounts.
- Prepare the stockholders' equity section of the company's balance sheet as of December 31, 20x5. Assume net income for 20x5 is \$108,000.

- P 5.** The stockholders' equity section of the Rigby Moving and Storage Company's balance sheet as of December 31, 20x2, was as follows:

Contributed Capital	
Common Stock, \$2 par value, 3,000,000 shares authorized, 500,000 shares issued and outstanding	\$1,000,000
Paid-in Capital in Excess of Par Value, Common	400,000
Total Contributed Capital	<u>\$1,400,000</u>
Retained Earnings	1,080,000
Total Stockholders' Equity	<u><u>\$2,480,000</u></u>

The company engaged in the following stockholders' equity transactions during 20x3:

- Mar. 5 Declared a \$.40 per share cash dividend to be paid on April 6 to stockholders of record on March 20.
- 20 Date of record.
- Apr. 6 Paid the cash dividend.
- June 17 Declared a 10 percent stock dividend to be distributed August 17 to stockholders of record on August 5. The market value of the stock was \$14 per share.
- Aug. 5 Date of record.
- 17 Distributed the stock dividend.
- Oct. 2 Split its stock 3 for 1.
- Dec. 27 Declared a cash dividend of \$.20 payable January 27, 20x4, to stockholders of record on January 14, 20x4.

On December 9, the board of directors restricted retained earnings for a pending lawsuit in the amount of \$200,000. The restriction should be shown in the notes to the firm's financial statements.

LO 6 Stock Dividend and Stock**LO 7 Split Transactions and Stockholders' Equity****LO 6 Dividends and Stock****LO 7 Split Transactions and Stockholders' Equity**

REQUIRED

LO 6 Comprehensive
LO 7 Stockholders' Equity
LO 8 Transactions



- Record the 20x3 transactions in journal form.
- Prepare the stockholders' equity section of the company's balance sheet as of December 31, 20x3, with an appropriate disclosure of the restriction on retained earnings. Assume net income for the year is \$400,000.

P 6. On December 31, 20x1, the stockholders' equity section of the Toczycki Company's balance sheet appeared as follows:

Contributed Capital	
Common Stock, \$8 par value, 200,000 shares authorized, 60,000 shares issued and outstanding	\$ 480,000
Paid-in Capital in Excess of Par Value, Common	1,280,000
Total Contributed Capital	\$1,760,000
Retained Earnings	824,000
Total Stockholders' Equity	<u>\$2,584,000</u>

The following are selected transactions involving stockholders' equity in 20x2: On January 4, the board of directors obtained authorization for 20,000 shares of \$40 par value noncumulative preferred stock that carried an indicated dividend rate of \$4 per share and was callable at \$42 per share. On January 14, the company sold 12,000 shares of the preferred stock at \$40 per share and issued another 2,000 in exchange for a building valued at \$80,000. On March 8, the board of directors declared a 2-for-1 stock split on the common stock. On April 20, after the stock split, the company purchased 3,000 shares of common stock for the treasury at an average price of \$12 per share; 1,000 of these shares subsequently were sold on May 4 at an average price of \$16 per share. On July 15, the board of directors declared a cash dividend of \$4 per share on the preferred stock and \$.40 per share on the common stock. The date of record was July 25. The dividends were paid on August 15. The board of directors declared a 15 percent stock dividend on November 28, when the common stock was selling for \$20. The record date for the stock dividend was December 15, and the dividend was to be distributed on January 5. The board of directors noted that note disclosure must be made of a bank loan agreement that requires minimum retained earnings. No cash dividends can be declared or paid if retained earnings fall below \$100,000.

REQUIRED

- Record the above transactions in journal form.
- Prepare the stockholders' equity section of the company's balance sheet as of December 31, 20x2, including an appropriate disclosure of the restrictions on retained earnings. Net loss for 20x2 was \$218,000. (**Hint:** Use T accounts to keep track of transactions.)
- Compute the book value per share for preferred and common stock (including common stock distributable) on December 31, 20x1 and 20x2, using end-of-year shares outstanding.

ALTERNATE PROBLEMS

P 7. Income statement information for the Sim Corporation during 20x1 is as follows:

- Administrative expenses, \$220,000.
- Cost of goods sold, \$880,000.
- Cumulative effect of a change in inventory methods that decreased income (net of taxes, \$56,000), \$120,000.
- Extraordinary loss from a storm (net of taxes, \$20,000), \$40,000.
- Income taxes expense, continuing operations, \$84,000.
- Net sales, \$1,780,000.
- Selling expenses, \$380,000.

REQUIRED

Prepare Sim Corporation's income statement for 20x1, including earnings per share, assuming a weighted average of 200,000 shares of common stock outstanding for 20x1.

LO 2 Corporate Income
LO 3 Statement



LO 6 Stock Dividend and Stock
LO 7 Split Transactions and
Stockholders' Equity



- P 8.** The stockholders' equity section of Waterbury Linen Mills, Inc., as of December 31, 20x2, was as follows:

Contributed Capital	
Common Stock, \$3 par value, 500,000 shares authorized, 40,000 shares issued and outstanding	\$120,000
Paid-in Capital in Excess of Par Value, Common	37,500
Total Contributed Capital	\$157,500
Retained Earnings	120,000
Total Stockholders' Equity	<u>\$277,500</u>

A review of the stockholders' equity records of Waterbury Linen Mills, Inc., disclosed the following transactions during 20x3:

- Mar. 25 The board of directors declared a 5 percent stock dividend to stockholders of record on April 20 to be distributed on May 1. The market value of the common stock was \$24 per share.
 Apr. 20 Date of record for the stock dividend.
 May 1 Issued the stock dividend.
 Sept. 10 Declared a 3-for-1 stock split.
 Dec. 15 Declared a 10 percent stock dividend to stockholders of record on January 15 to be distributed on February 15. The market price on this date is \$9 per share.

REQUIRED

- Record the transactions for Waterbury Linen Mills, Inc., in T accounts.
- Prepare the stockholders' equity section of the company's balance sheet as of December 31, 20x3. Assume net income for 20x3 is \$247,000.

- P 9.** The balance sheet of the O'Connor Woolen Company disclosed the following stockholders' equity as of September 30, 20x1:

Contributed Capital	
Common Stock, \$4 par value, 1,000,000 shares authorized, 300,000 shares issued and outstanding	\$1,200,000
Paid-in Capital in Excess of Par Value, Common	740,000
Total Contributed Capital	\$1,940,000
Retained Earnings	700,000
Total Stockholders' Equity	<u>\$2,640,000</u>

The following stockholders' equity transactions were completed during the next fiscal year in the order presented:

20x1

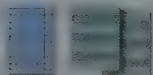
- Dec. 17 Declared a 10 percent stock dividend to be distributed January 20 to stockholders of record on January 1. The market value per share on the date of declaration was \$8.

20x2

- Jan. 1 Date of record.
 20 Distributed the stock dividend.
 Apr. 14 Declared a \$.50 per share cash dividend. The cash dividend is payable May 15 to stockholders of record on May 1.
 May 1 Date of record.
 15 Paid the cash dividend.
 June 17 Split its stock 2 for 1.
 Sept. 15 Declared a cash dividend of \$.30 per share payable October 10 to stockholders of record on October 1.

On September 14, the board of directors restricted retained earnings for plant expansion in the amount of \$300,000. The restriction should be shown in the notes to the financial statements.

LO 6 Dividends and Stock
LO 7 Split Transactions and
Stockholders' Equity



REQUIRED

1. Record the above transactions in journal form.
2. Prepare the stockholders' equity section of the company's balance sheet as of September 30, 20x2, with an appropriate disclosure of the restriction of retained earnings. Assume net income for the year is \$300,000.

EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

LO 1 Classic Quality of LO 4 Earnings



SD 1. On Tuesday, January 19, 1988, *International Business Machines Corp. (IBM)*, the world's largest computer manufacturer, reported greatly increased earnings for the fourth quarter of 1987. Despite this reported gain in earnings, the price of IBM's stock on the New York Stock Exchange declined by \$6 per share to \$111.75. In sympathy with this move, most other technology stocks also declined.²³

IBM's fourth-quarter net earnings rose from \$1.39 billion, or \$2.28 a share, to \$2.08 billion, or \$3.47 a share, an increase of 49.6 percent and 52.2 percent over the year-earlier period. Management declared that these results demonstrated the effectiveness of IBM's efforts to become more competitive and that, despite the economic uncertainties of 1988, the company was planning for growth.

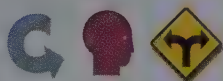
The apparent cause of the stock price decline was that the huge increase in income could be traced to nonrecurring gains. Investment analysts pointed out that IBM's high earnings stemmed primarily from factors such as a lower tax rate. Despite most analysts' expectations of a tax rate between 40 and 42 percent, IBM's was a low 36.4 percent, down from the previous year's 45.3 percent. Analysts were also disappointed in IBM's revenue growth. Revenues within the United States were down, and much of the growth in revenues came through favorable currency translations, increases that might not be repeated. In fact, some estimates of the fourth-quarter earnings attributed \$.50 per share to currency translations and another \$.25 to tax-rate changes.

Other factors contributing to the rise in earnings were one-time transactions, such as the sale of Intel Corporation stock and bond redemptions, along with a corporate stock buyback program that reduced the amount of stock outstanding in the fourth quarter by 7.4 million shares.

The analysts were concerned about the quality of IBM's earnings. Identify four quality of earnings issues reported in the case and the analysts' concern about each. In percentage terms, what is the impact of the currency changes on fourth-quarter earnings? Comment on management's assessment of IBM's performance. Do you agree with management? (Optional question: What has IBM's subsequent performance been?) Be prepared to discuss your answers to the questions in class.

Ethical Dilemma

LO 7 Ethics and Stock Dividends



SD 2. For 20 years *Bass Products Corporation*, a public corporation, has followed the practice of paying a cash dividend every quarter and has promoted itself to investors as a stable, reliable company. Recent competition from Asian companies has negatively affected its earnings and cash flows. As a result, Sandra Bass, president of the company,



Cash Flow



CD-ROM



Communication



Critical Thinking



Ethics



General Ledger



Group Activity



Hot Links to Real Companies



International



Internet



Key Ratio



Memo



Spreadsheet

is proposing that the board of directors declare a stock dividend of 5 percent this year instead of a cash dividend. She says, "This will maintain our consecutive dividend record and will not require any cash outflow." What is the difference between a cash dividend and a stock dividend? Why does a corporation usually distribute either kind of dividend, and how does each affect the financial statements? Is the action proposed by Bass ethical?

SD 3.

At the beginning of 20x1, Ted Lazzerini retired as president and principal stockholder in *Tedtronics Corporation*, a successful producer of personal computer equipment. As an incentive to the new management, Lazzerini supported the board of directors' new executive compensation plan, which provides cash bonuses to key executives for years in which the company's earnings per share equal or exceed the current dividends per share of \$2.00, plus a \$.20 per share increase in dividends for each future year. Thus, for management to receive the bonuses, the company must earn per-share income of \$2.00 the first year, \$2.20 the second, \$2.40 the third, and so forth. Since Lazzerini owns 500,000 of the 1,000,000 common shares outstanding, the dividend income will provide for his retirement years. He is also protected against inflation by the regular increase in dividends. Earnings and dividends per share for the first three years of operation under the new management are as follows:

	20x3	20x2	20x1
Earnings per share	\$2.50	\$2.50	\$2.50
Dividends per share	2.40	2.20	2.00

During this time, management earned bonuses totaling more than \$1 million under the compensation plan. Lazzerini, who had taken no active part on the board of directors, began to worry about the unchanging level of earnings and decided to study the company's annual report more carefully. The notes to the annual report revealed the following information:

- Management changed from the LIFO inventory method to the FIFO method in 20x1. The effect of the change was to decrease cost of goods sold by \$200,000 in 20x1, \$300,000 in 20x2, and \$400,000 in 20x3.
 - Management changed from the double-declining-balance accelerated depreciation method to the straight-line method in 20x2. The effect of this change was to decrease depreciation by \$400,000 in 20x2 and by \$500,000 in 20x3.
 - In 20x3, management increased the estimated useful life of intangible assets from five to ten years. The effect of this change was to decrease amortization expense by \$100,000 in 20x3.
- Compute earnings per share for each year according to the accounting methods in use at the beginning of 20x1. (Use common shares outstanding.)
 - Is the action of the executives ethical? Have the executives earned their bonuses? What serious effect has the compensation package apparently had on the net assets of Tedtronics Corporation? How could Lazzerini have protected himself?

Research Activity

SD 4.

Select the annual reports of three corporations, using one or more of the following sources: your library, the Fingraph® Financial Analyst™ CD-ROM software that accompanies this text, or the Needles Accounting Resource Center web site at <http://college.hmco.com>. You may choose companies from the same industry or at random, at the direction of your instructor. (If you completed the related research activity in the chapter on contributed capital, use the same three companies.) Prepare a table with a column for each corporation. Then, for any year covered by the balance sheet, the statement of stockholders' equity, and the income statement, answer the following questions: Does the company own treasury stock? Was any treasury stock bought or retired? Did the company declare a stock dividend or a stock split? What other transactions appear in the statement of stockholders' equity? Has the company deferred any income taxes? Were there any discontinued operations, extraordinary items, or accounting changes? Compute the book value per common share for the company. In *The Wall Street Journal* or the financial section of another daily newspaper, find the current market price of each company's common stock and compare it to the book value you

LO 1 Effect of Alternative LO 5 Accounting Methods on Executive Compensation



LO 2 Corporate Income LO 3 Statement, Statement of LO 4 Stockholders' Equity, and LO 6 Book Value

LO 7
LO 8

computed. Should there be any relationship between the two values? Be prepared to discuss your answers to these questions in class.

Decision-Making Practice

- LO 6** Analyzing Effects of
LO 7 Stockholders' Equity
LO 8 Transactions



505. *Metzger Steel Corporation (MSC)* is a small specialty steel manufacturer located in northern Alabama that has been owned by the Metzger family for several generations. Arnold Metzger is a major shareholder in MSC by virtue of his having inherited 200,000 shares of common stock in the company. Metzger has not shown much interest in the business because of his enthusiasm for archaeology, which takes him to far parts of the world. However, when he received the minutes of the last board of directors meeting, he questioned a number of transactions involving stockholders' equity. He asks you, as a person with a knowledge of accounting, to help him interpret the effect of these transactions on his interest in MSC.

You begin by examining the stockholders' equity section of MSC's December 31, 20x1, balance sheet:

Metzger Steel Corporation Stockholders' Equity December 31, 20x1	
Contributed Capital	
Common Stock, \$10 par value, 5,000,000 shares authorized, 1,000,000 shares issued and outstanding	\$10,000,000
Paid-in Capital in Excess of Par Value, Common	25,000,000
Total Contributed Capital	\$35,000,000
Retained Earnings	20,000,000
Total Stockholders' Equity	\$55,000,000

Then you read the relevant parts of the minutes of the December 15, 20x2, meeting of the firm's board of directors:

Item A: The president reported the following transactions involving the company's stock during the last quarter.

October 15. Sold 500,000 shares of authorized common stock through the investment banking firm of T.R. Kendall at a net price of \$50 per share.

November 1. Purchased 100,000 shares for the corporate treasury from Lucy Metzger at a price of \$55 per share.

Item B: The board declared a 2-for-1 stock split (accomplished by halving the par value and doubling each stockholder's shares), followed by a 10 percent stock dividend. The board then declared a cash dividend of \$2 per share on the resulting shares. Cash dividends are declared on outstanding shares and shares distributable. All these transactions are applicable to stockholders of record on December 20 and are payable on January 10. The market value of MSC stock on the board meeting date after the stock split was estimated to be \$30.

Item C: The chief financial officer stated that he expected the company to report net income for the year of \$4,000,000.

1. Prepare a stockholders' equity section of MSC's balance sheet as of December 31, 20x2, that reflects the transactions above. (**Hint:** Use T accounts to analyze the transactions. Also, use a T account in order to keep track of the shares of common stock outstanding.)
2. Write a memorandum to Arnold Metzger that shows the book value per share and Metzger's percentage of ownership at the beginning and end of the year. Explain the difference and state whether Metzger's position has improved during the year. Tell why or why not and state how Metzger may be able to maintain his percentage of ownership.

FINANCIAL REPORTING AND ANALYSIS

Interpreting Financial Reports

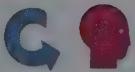
LO 6 Interpretation of Statement of Stockholders' Equity

FRA 1.

The consolidated statement of stockholders' equity for *Jackson Electronics, Inc.*, a manufacturer of a broad line of electrical components, appears as presented below.

Jackson Electronics, Inc. Consolidated Statement of Stockholders' Equity (In thousands)						
	Preferred Stock	Common Stock	Paid-in Capital in Excess of Par Value, Common	Retained Earnings	Treasury Stock, Common	Total
Balance at September 30, 20x1	\$2,756	\$3,902	\$14,149	\$119,312	(\$ 942)	\$139,177
Year Ended September 30, 20x2						
Net income	—	—	—	18,753	—	18,753
Redemption and retirement of Preferred Stock (27,560 shares)	(2,756)	—	—	—	—	(2,756)
Stock options exercised (89,000 shares)	—	89	847	—	—	936
Purchases of Common Stock for treasury (501,412 shares)	—	—	—	—	(12,552)	(12,552)
Issuance of Common Stock (148,000 shares) in exchange for convertible subordinated debentures	—	148	3,635	—	—	3,783
Issuance of Common Stock (715,000 shares) for cash	—	715	24,535	—	—	25,250
Issuance of 500,000 shares of Common Stock in exchange for investment in Electrix Company shares	—	500	17,263	—	—	17,763
Cash dividends—Common Stock (\$.80 per share)	—	—	—	(3,086)	—	(3,086)
Balance at September 30, 20x2	<u>\$ —</u>	<u>\$5,354</u>	<u>\$60,429</u>	<u>\$134,979</u>	<u>(\$13,494)</u>	<u>\$187,268</u>

REQUIRED



This statement of stockholders' equity has eight summary transactions. Show that you understand it by preparing an entry in journal form with an explanation for each. In each case, if applicable, determine the average price per common share. At times you will also have to make assumptions about an offsetting part of the entry. For example, assume debentures (long-term bonds) are recorded at face value and that employees pay cash for stock purchased under company incentive plans.

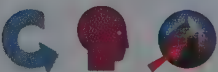
Group Activity: Assign each transaction to a different group to develop the entry and present the explanation to the class.

FRA 2.

LO 3 Analysis of Income Taxes from Annual Report

In its 1999 annual report, *The Washington Post Company*, a newspaper publishing and television broadcasting company based in Washington, D.C., provided the following data about its current and deferred income tax provisions (in millions):²⁴

	1999	
	Current	Deferred
U.S. federal	\$ 94.6	\$30.3
Foreign	1.3	—
State	23.7	(.3)
	<u>\$119.6</u>	<u>\$30.0</u>



REQUIRED

1. What was the 1999 income taxes expense? Record in journal form the overall income tax liability for 1999, using income tax allocation procedures.
2. In the long-term liability section of the balance sheet, The Washington Post Company shows deferred income taxes of \$112.4 million in 1999 versus \$83.7 million in 1998. This shows an increase in the amount of deferred income taxes. How do such deferred income taxes arise? What would cause deferred income taxes to increase? Give an example of this process. Given the definition of a liability, do you see a potential problem with the company's classifying deferred income taxes as a liability?

International Company

FRA 3.

In some countries, including Japan, the availability of retained earnings for the payment of dividends is restricted. The following disclosure appeared in the annual report of *Yamaha Motor Company, Ltd.*, the Japanese motorcycle manufacturer:²⁵

The Commercial Code of Japan provides that an amount not less than 10 percent of the total of cash dividends and bonuses [paid] to directors and corporate auditors be appropriated as a legal reserve until such reserve equals 25 percent of stated capital. The legal reserve may be used to reduce a deficit or may be transferred to stated capital, but is not available as dividends.

Stated capital is equivalent to common stock. For Yamaha, this legal reserve amounted to ¥34.4 billion, or \$310 million. How does this practice differ from that in the United States? Why do you think it is government policy in Japan? Do you think it is a good idea?

LO 6 Restriction of Retained Earnings



Toys "R" Us Annual Report

FRA 4.

Refer to the Toys "R" Us annual report to answer the following questions:

1. Does Toys "R" Us have discontinued operations, extraordinary items, or cumulative changes in accounting principles? Would you say the income statement for Toys "R" Us is relatively simple or relatively complex?
2. What transactions most commonly affect the stockholders' equity section of the balance sheet of Toys "R" Us? Examine the statement of stockholders' equity.
3. Compute the book value of Toys "R" Us stock in 2000 and 1999 and compare it to the market price. What interpretation do you place on these relationships?

LO 2 Corporate Income
LO 4 Statement, Statement of
LO 6 Stockholders' Equity, and
LO 8 Book Value per Share



Fingraph® Financial Analyst™

FRA 5.

Choose any two companies from the same industry in the Fingraph® Financial Analyst™ CD-ROM software.

1. In the annual reports for the companies you have selected, identify the corporate income statement and its summary of significant accounting policies, usually the first note to the financial statements. Did the companies report any discontinued operations, extraordinary items, or accounting changes? What percentage impact did these items have on earnings per share? Summarize the methods and estimates each company uses in a table. If the company changed its accounting methods, was the change the result of a new accounting standard or a voluntary choice by management? Evaluate the quality of earnings for each company.
2. Did the companies report a statement of stockholders' equity or summarize the changes in stockholders' equity in the notes only? Did the companies declare any stock dividends or stock splits? Calculate book value per common share.
3. Find in the financial section of your local paper the current market prices of the companies' common stock. Discuss the difference between market price per share and book value per share.
4. Find and read references to earnings per share in management's discussion and analysis in each annual report.

LO 1 Stockholders' Equity Analysis



5. Write a one-page executive summary that highlights the quality of earnings for these companies, the relationship of book value and market value, and the existence or absence of stock splits or dividends, including reference to management's assessment. Include your table as an attachment to your report.

Internet Case

FRA 6.

Reporting comprehensive income by public companies is a recent requirement. No specific guidelines were stated for how this amount and its components are disclosed. Choose two companies in the same industry from the Needles Accounting Resource Center at <http://college.hmco.com>. Using companies under web links, go to the annual reports on the web sites for the two companies you have selected. In the latest annual report, look at the financial statements. How have your two companies reported comprehensive income—as a part of the income statement, a part of stockholders' equity, or a separate statement? What items cause there to be a difference between net income and comprehensive income? Is comprehensive income greater or less than net income? Is comprehensive income more volatile than net income? Which measure of income is used to compute basic earnings per share?

- LO 2** Comparison of
LO 5 Comprehensive Income
LO 6 Disclosures



ENDNOTES

1. DaimlerChrysler AG, *Annual Report*, 1999.
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4. Ann Davis, "SEC Case Claims Profit Management by Grace," *The Wall Street Journal*, April 7, 1999.
5. Bernard Condon, "Pick a Number, Any Number," *Forbes*, March 23, 1998.
6. Sears, Roebuck and Co., *Annual Report*, 1997.
7. *Statement of Financial Accounting Standards No. 130*, "Reporting Comprehensive Income" (Norwalk, Conn.: Financial Accounting Standards Board, 1997).
8. American Institute of Certified Public Accountants, *Accounting Trends & Techniques* (New York: American Institute of Certified Public Accountants, 1999).
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13. American Institute of Certified Public Accountants, *Accounting Trends & Techniques* (New York: American Institute of Certified Public Accountants, 1999).
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22. Ibid., par. 13.
23. "Technology Firms Post Strong Earnings But Stock Prices Decline Sharply," *The Wall Street Journal*, January 21, 1988; Donald R. Seace, "Industrials Plunge 57.2 Points—Technology Stocks' Woes Cited," *The Wall Street Journal*, January 21, 1988.
24. The Washington Post Company, *Annual Report*, 1999.
25. Yamaha Motor Company, Ltd., *Annual Report*, 1999.

16


Long-Term Liabilities

LEARNING OBJECTIVES

- 1** Identify the management issues related to issuing long-term debt.
- 2** Identify and contrast the major characteristics of bonds.
- 3** Record the issuance of bonds at face value and at a discount or premium.
- 4** Use present values to determine the value of bonds.
- 5** Use the straight-line and effective interest methods to amortize bond discounts and premiums.
- 6** Account for bonds issued between interest dates and make year-end adjustments.
- 7** Account for the retirement of bonds and the conversion of bonds into stock.
- 8** Explain the basic features of mortgages payable, installment notes payable, long-term leases, and pensions and other postretirement benefits as long-term liabilities.



DECISION POINT: A USER'S FOCUS

 **AT&T Corporation** Long-term liabilities, or long-term debt, are obligations of a business that are due to be paid after one year or beyond the operating cycle, whichever is longer. Decisions related to the issuance of long-term debt are among the most important that management has to make because, next to the success or failure of a company's operations, how the company finances its operations is the most important factor in the company's long-term viability. AT&T Corporation is a company that has a large amount of long-term debt, as shown by the figures for 1999 in the Financial Highlights.¹ Total liabilities are greater than stockholders' equity, and the debt to equity ratio is .9 ($\$81,762 \div \$87,644$). What factors might have influenced AT&T's management to incur such a large amount of debt?

In the past, AT&T was the nation's only long-distance telephone company. The investments in power lines, transformers, computers, and other types of property, plant, and equipment required for this business are enormous. These are mostly long-term assets, and the most sensible way to finance them is through long-term financing. When the business was protected from competition, management could reasonably predict sufficient earnings and cash flow to meet the debt and interest obligations. Also, over the years, AT&T has been very generous to employees in promising benefits that will be paid after the employees retire. Now that AT&T is facing open competition for its markets, the company must reassess not only the kind of business it is but also the amount and kinds of debt it carries. The company

Financial Highlights

(In millions)

Liabilities

Total current liabilities	\$ 28,207
Long-term debt	\$ 21,591
Long-term benefit-related liabilities	3,964
Deferred income taxes	24,199
Other long-term liabilities and deferred credits	3,801
Total long-term liabilities	\$ 53,555

Total liabilities

\$ 81,762

Stockholders' equity

87,644

Total liabilities and stockholders' equity

\$169,406

has expanded its data, Internet, broadband, local, and wireless networks. This expansion required increased capital spending and borrowing. The amount and type of debt a company incurs will depend on many factors, including the nature of the business, its competitive environment, the state of the financial markets, and the predictability of its earnings.

Management Issues Related to Issuing Long-Term Debt

OBJECTIVE

1 Identify the management issues related to issuing long-term debt

Profitable operations and short-term credit are seldom sufficient for a growing business that must invest in long-term assets and in research and development and other activities that will produce income in future years. For such assets and activities, the company requires funds that will be available for longer periods of time. Two key sources of long-term funds are the issuance of capital stock and the issuance of long-term debt in the form of bonds, notes, mortgages, and leases. The management issues related to issuing long-term debt are (1) whether or not to have long-term debt, (2) how much long-term debt to have, and (3) what types of long-term debt to have.

The Decision to Issue Long-Term Debt

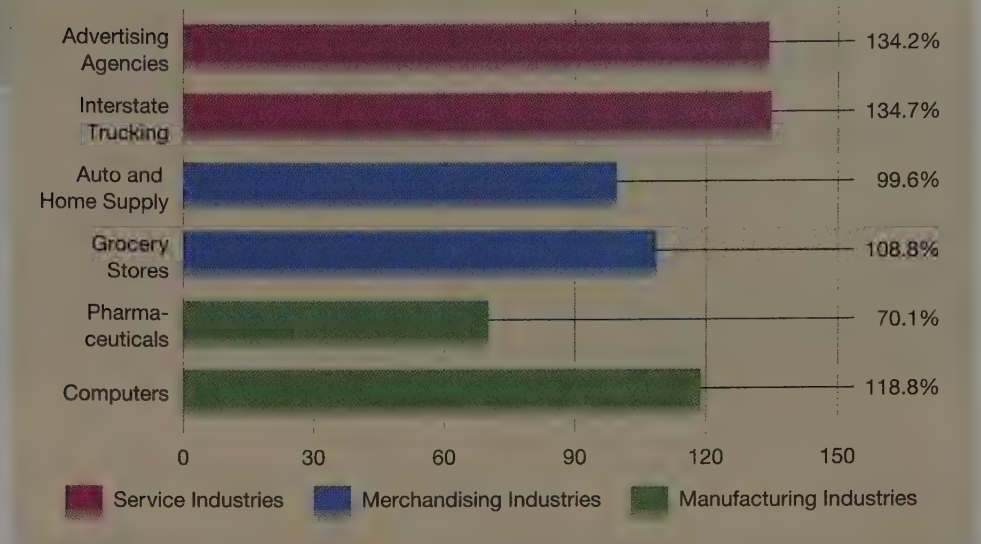
A key decision faced by management is whether to rely solely on stockholders' equity—capital stock issued and retained earnings—for long-term funds for the business or to rely partially on long-term debt for those funds.

Because long-term debts represent financial commitments that must be paid at maturity and interest or other payments that must be paid periodically, common stock would seem to have two advantages over long-term debt: Common stock does not have to be paid back, and dividends on common stock are usually paid only if the company earns sufficient income. Long-term debt does, however, have some advantages over common stock:

1. *Stockholder control* Since bondholders and other creditors do not have voting rights, common stockholders do not relinquish any control of the company.
2. *Tax effects* The interest on debt is tax deductible, whereas dividends on common stock are not. For example, if a corporation pays \$100,000 in interest and the income tax rate is 30 percent, the net cost to the corporation is \$70,000 because it will save \$30,000 on its income taxes. To pay \$100,000 in dividends, the company would have to earn \$142,857 before taxes [$\$100,000 \div (1 - .30)$].
3. *Financial leverage* If a corporation is able to earn more on its assets than it pays in interest on debt, all of the excess will increase its earnings for stockholders. This concept is called **financial leverage**, or *trading on the equity*. For example, if a company is able to earn 12 percent, or \$120,000, on a \$1,000,000 investment financed by long-term 10 percent notes, it will earn \$20,000 before taxes ($\$120,000 - \$100,000$). Financial leverage makes heavily debt-financed investments in office buildings and shopping centers attractive to investors: They hope to earn a return that exceeds the cost of the interest on the underlying debt. The debt to equity ratio is considered an overall measure of the financial leverage of a company.

Despite these advantages, using debt financing is not always in a company's best interest. First, because cash is required to make periodic interest payments and to

Figure 1
Average Debt to Equity for
Selected Industries



Source: Data from Dun & Bradstreet, *Industry Norms and Key Business Ratios*, 1999–2000.

pay back the principal amount of the debt at the maturity date, a company whose plans for earnings do not pan out, whose operations are subject to ups and downs, or whose cash flow is weak can be in danger. If the company fails to meet its obligations, it can be forced into bankruptcy by creditors. In other words, a company may become overcommitted. Consider, for example, the heavily debt-financed airline industry. Companies such as TWA and Continental Airlines became bankrupt because they could not make payments on their long-term debt and other liabilities. Second, financial leverage can work against a company if the earnings from its investments do not exceed its interest payments. This happened during the savings and loan crisis when long-term debt was used to finance the construction of office buildings that subsequently could not be leased for enough money to cover interest payments. In recent years, the good economy has enabled airlines to take advantage of their high financial leverage to improve earnings.

How Much Debt

Although some companies carry amounts of total debt that exceed 100 percent of their stockholders' equity, many companies carry less, as can be seen from Figure 1, which shows the average debt to equity for selected industries. The range is from about 70 percent to 135 percent of equity. Clearly the use of debt financing varies widely across industries. Firms that own a high percentage of long-term assets would be looking to long-term financing as an option. We saw previously that AT&T has a debt to equity ratio of .9 times. Financial leverage makes it advantageous to have long-term debt so long as the company earns a satisfactory income and is able to make interest payments and repay the debt at maturity. Because failure to make timely interest payments could possibly force a company into bankruptcy, it is important for companies to assess the risk of default or nonpayment of interest or principal.

A common measure of how much risk a company is undertaking with its debt is the **interest coverage ratio**. It measures the degree of protection a company has from default on interest payments. This measure can help to assess the safety of AT&T in light of its increasing amount of debt. This ratio for AT&T, which in 1999 had income before taxes of \$6,685 million and interest expense of \$1,651 million, is computed as follows:

FOCUS ON BUSINESS PRACTICE

Missing interest payments on debt is serious business for companies. On March 3, 1995, Trans World Airlines, Inc. (TWA), reached the end of a 30-day grace period on the payment of \$255 million of interest on its long-term notes. Standard & Poor's lowered the company's debt rating to D, its lowest category. If TWA

had not paid by the end of the day, any group representing at least 25 percent of its noteholders could have forced the company into bankruptcy by invoking an acceleration notice that would make all the loans due immediately.² This action would have been unfortunate because the company was recovering after many years of losses. The company was able to meet the interest payment and continue its recovery. However, intense competition within the airline industry forced TWA to file for bankruptcy again in early 2001 before being purchased by American Airlines.



$$\begin{aligned}\text{Interest Coverage Ratio} &= \frac{\text{Income Before Taxes} + \text{Interest Expense}}{\text{Interest Expense}} \\ &= \frac{\$6,685,000,000 + \$1,651,000,000}{\$1,651,000,000} \\ &= 5.0 \text{ times}\end{aligned}$$

This ratio shows that the interest expense for AT&T is covered 5.0 times. The coverage ratio for AT&T is in line with previous years and shows that AT&T has adequate interest coverage in spite of its large amount of debt.

What Types of Long-Term Debt

The most common type of long-term debt is long-term bonds (most of which are also called *debentures*). These can have many different characteristics, including the time until repayment, the amount of interest, whether or not the company can elect to repay early, and whether the bonds can be converted into other securities like common stock. However, there are many other types of long-term debt. Some examples are long-term notes, mortgages, and long-term leases. AT&T, for example, has a mixture of long-term obligations, as shown by the following excerpt from its 1999 annual report (in millions):



Financial Highlights: Long-Term Obligations

(This table shows the outstanding long-term debt obligations at December 31.)

Interest Rates (b)	Maturities	1999
Debentures and Notes		
4.38%–6.00%	2001–2014	\$ 5,251
6.34%–7.50%	2000–2029	8,068
7.53%–8.50%	2000–2026	4,762
8.60%–11.13%	2000–2031	3,763
Variable rate	2000–2054	867
Total debentures and notes		22,711
Other		362
Less: Unamortized discount—net		(127)
Total long-term obligations		22,946
Less: Currently maturing long-term debt		1,355
Net long-term obligations		<u>\$21,591</u>

It is important that managers know the characteristics of the various types of long-term liabilities so that they can structure a company's long-term financing to the best advantage of the company.

The Nature of Bonds

OBJECTIVE

2 Identify and contrast the major characteristics of bonds

A **bond** is a security, usually long term, representing money borrowed from the investing public by a corporation or some other entity. (Bonds are also issued by the U.S. government, state and local governments, and foreign companies and countries to raise money.) A bond must be repaid at a specified time and requires periodic payments of interest.* Interest is usually paid semiannually (twice a year). Bonds must not be confused with stocks. Because stocks are shares of ownership, stockholders are owners. Bondholders are creditors. Bonds are promises to repay the amount borrowed, called the *principal*, and interest at a specified rate on specified future dates.

A bondholder receives a bond certificate (in past years) or a registration number (in recent years) as evidence of the organization's debt. In most cases, the face value (denomination) of the bond is \$1,000 or some multiple of \$1,000. A **bond issue** is the total number of bonds issued at one time. For example, a \$1,000,000 bond issue could consist of 1,000 \$1,000 bonds. Because a bond issue can be bought and held by many investors, the organization usually enters into a supplementary agreement called a **bond indenture**. The bond indenture defines the rights, privileges, and limitations of the bondholders. It generally describes such things as the maturity date of the bonds, interest payment dates, interest rate, and other characteristics of the bonds. Repayment plans and restrictions also may be covered.

The prices of bonds are stated in terms of a percentage of face value. A bond issue quoted at 103½ means that a \$1,000 bond costs \$1,035 ($\$1,000 \times 1.035$). When a bond sells at exactly 100, it is said to sell at face or par value. When it sells above 100, it is said to sell at a premium; below 100, at a discount. A \$1,000 bond quoted at 87.62 would be selling at a discount and would cost the buyer \$876.20.

A bond indenture can be written to fit the financing needs of an individual organization. As a result, the bonds being issued in today's financial markets have many different features. Several of the more important ones are described in the following paragraphs.

Secured or Unsecured Bonds

Bonds can be either secured or unsecured. If issued on the general credit of the organization, they are **unsecured bonds** (also called *debenture bonds*). **Secured bonds** give the bondholders a pledge of certain assets as a guarantee of repayment. The security identified by a secured bond can be any specific asset of the organization or a general category of asset, such as property, plant, or equipment.

Term or Serial Bonds

When all the bonds of an issue mature at the same time, they are called **term bonds**. For instance, an organization may decide to issue \$1,000,000 worth of

*At the time this chapter was written, the market interest rates on corporate bonds were volatile. Therefore, the examples and problems in this chapter use a variety of interest rates to demonstrate the concepts.

FOCUS ON INTERNATIONAL BUSINESS

When U.S. companies need cash, one ready source is a bond issue, but this source of funds is not available in many other countries. For instance, surprising as it may seem, Japan, the world's second largest economy and financial system, has only a fledgling corporate bond market. Whereas regular corporate bonds account for

31 percent of U.S. corporate debt, only 57, or 2 percent, of the 2,500 publicly listed companies in Japan have any domestic bonds outstanding. Japanese companies have traditionally relied on loans from big Japanese banks when they need cash. This caused problems for Japanese companies in the 1990s because Japanese banks did not have the funds to lend them as a result of the collapse of the real estate industry in Japan.³ Similar problems have occurred more recently in other Asian countries.

bonds, all due 20 years from the date of issue. If the bonds in an issue mature on several different dates, the bonds are **serial bonds**. An example of serial bonds would be a \$1,000,000 issue that calls for retiring \$200,000 of the principal every five years. This arrangement means that after the first \$200,000 payment is made, \$800,000 of the bonds would remain outstanding for the next five years. In other words, \$1,000,000 is outstanding for the first five years, \$800,000 for the second five years, and so on. An organization may issue serial bonds to ease the task of retiring its debt.

Accounting for Bonds Payable

OBJECTIVE

3 Record the issuance of bonds at face value and at a discount or premium

When the board of directors of a corporation decides to issue bonds, it customarily presents the proposal to the stockholders. If the stockholders agree to the issue, the company prints the certificates and draws up an appropriate legal document. The bonds are then authorized for issuance. It is not necessary to make a journal entry for the authorization, but most companies prepare a memorandum in the Bonds Payable account describing the issue. This note lists the number and value of bonds authorized, the interest rate, the interest payment dates, and the life of the bonds.

Once the bonds are issued, the corporation must pay interest to the bondholders over the life of the bonds (in most cases, semiannually) and the principal of the bonds at maturity.

Balance Sheet Disclosure of Bonds

Bonds payable and unamortized discounts or premiums (which we explain later) are typically shown on a company's balance sheet as long-term liabilities. However, if the maturity date of the bond issue is one year or less and the bonds will be retired using current assets, Bonds Payable should be listed as a current liability. If the issue is to be paid with segregated assets or replaced by another bond issue, the bonds should still be shown as a long-term liability.

Important provisions of the bond indenture are reported in the notes to the financial statements, as illustrated by the earlier excerpt from the AT&T annual report. Often reported with them is a list of all bond issues, the kinds of bonds, interest rates, any securities connected with the bonds, interest payment dates, maturity dates, and effective interest rates.



Bonds Issued at Face Value

Suppose that the Vason Corporation has authorized the issuance of \$100,000 of 9 percent, five-year bonds on January 1, 20x0. According to the bond indenture, interest is to be paid on January 1 and July 1 of each year. Assume that the bonds are sold on January 1, 20x0, for their face value. The entry to record the issuance is as follows:

20x0				
A = L + OE	Jan. 1	Cash	100,000	
+ +		Bonds Payable		100,000
		Sold \$100,000 of 9 percent, five-year bonds at face value		

As stated above, interest is paid on January 1 and July 1 of each year. Therefore, the corporation would owe the bondholders \$4,500 interest on July 1, 20x0:

$$\begin{aligned}\text{Interest} &= \text{Principal} \times \text{Rate} \times \text{Time} \\ &= \$100,000 \times .09 \times \frac{6}{12} \text{ year} \\ &= \$4,500\end{aligned}$$

The interest paid to the bondholders on each semiannual interest payment date (January 1 or July 1) would be recorded as follows:

A* = L + OE	Bond Interest Expense	4,500	
- -	Cash (or Interest Payable)		4,500
*Assumes cash paid.	Paid (or accrued) semiannual interest to bondholders of 9 percent, five-year bonds		

Face Interest Rate and Market Interest Rate

When issuing bonds, most organizations try to set the face interest rate as close as possible to the market interest rate. The **face interest rate** is the rate of interest paid to bondholders based on the face value, or principal, of the bonds. The rate and amount are fixed over the life of the bond. An organization must decide in

FOCUS ON BUSINESS PRACTICE

The price for many bonds may be found daily in business publications like *The Wall Street Journal*. For instance, to the right are the quotations for a number of AT&T Corporation bonds.⁴ The first bond is an AT&T bond with a face interest rate of 5½ percent that is due in 2001. The current yield is 5.2 percent based on the closing price of 97⅞. Five \$1,000 bonds were traded (volume), and the last sale was up by ¼ point from the previous day's last sales.

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New York Exchange Bonds

Corporation Bonds (Volume) \$10,063,000

Bonds	Cur Yld	Vol	Close	Net Chg
ATT 5½01	5.2	5	97⅞	+ ¼
ATT 7½02	7.2	50	99½	...
ATT 6¾04	6.9	34	97½	+ ¼
ATT 5½04	6.0	10	93¼	+ ⅝
ATT 7½06	7.5	55	100	- ⅛
ATT 7¾07	7.7	100	101⅛	+ ¼
ATT 6s09	6.9	176	86½	+ ½
ATT 8¾22	8.4	228	96½	- ¾
ATT 8¾24	8.5	466	96	...
ATT 6½29	8.1	51	80½	+ ⅞
ATT 8½31	8.8	385	98⅝	+ ⅛

advance what the face interest rate will be to allow time to file with regulatory bodies, publicize the issue, and print the certificates.

The **market interest rate** is the rate of interest paid in the market on bonds of similar risk. It is also referred to as the *effective interest rate*. The market interest rate fluctuates daily. Because an organization has no control over the market interest rate, there is often a difference between the market interest rate and the face interest rate on the issue date. The result is that the issue price of the bonds does not always equal their face value. If the market interest rate is higher than the face interest rate, the issue price will be less than the face value and the bonds are said to be issued at a **discount**. The discount equals the excess of the face value over the issue price. On the other hand, if the market interest rate is lower than the face interest rate, the issue price will be more than the face value and the bonds are said to be issued at a **premium**. The premium equals the excess of the issue price over the face value.

Bonds Issued at a Discount

Suppose that the Vason Corporation issues \$100,000 of 9 percent, five-year bonds at 96.149 on January 1, 20x0, when the market interest rate is 10 percent. In this case, the bonds are being issued at a discount because the market interest rate exceeds the face interest rate. The following entry records the issuance of the bonds at a discount:

A = L + OE

+ + -

20x0			
Jan. 1	Cash	96,149	
	Unamortized Bond Discount	3,851	
	Bonds Payable		100,000
	Sold \$100,000 of 9 percent, five-year bonds at 96.149		
	Face amount of bonds	\$100,000	
	Less purchase price of bonds (\$100,000 × .96149)	96,149	
	Unamortized bond discount	\$ 3,851	

In the entry, Cash is debited for the amount received (\$96,149), Bonds Payable is credited for the face amount (\$100,000) of the bond liability, and the difference (\$3,851) is debited to Unamortized Bond Discount. If a balance sheet is prepared right after the bonds are issued at a discount, the liability for bonds payable is reported as follows:

Long-Term Liabilities		
9% Bonds Payable, due 1/1/x5	\$100,000	
Less Unamortized Bond Discount	3,851	\$96,149

Unamortized Bond Discount is a contra-liability account: Its balance is deducted from the face amount of the bonds to arrive at the carrying value, or present value, of the bonds. The bond discount is described as unamortized because it will be amortized (written off) over the life of the bonds.

Bonds Issued at a Premium

When bonds have a face interest rate above the market rate for similar investments, they are issued at a price above the face value, or at a premium. For example, assume that the Vason Corporation issues \$100,000 of 9 percent, five-year bonds for \$104,100 on January 1, 20x0, when the market interest rate is 8 percent. This means that investors will purchase the bonds at 104.1 percent of their face value. The issuance would be recorded as follows:

A = L + OE		20x0		
+	+	Jan. 1	Cash	104,100
	+		Unamortized Bond Premium	4,100
			Bonds Payable	100,000
			Sold \$100,000 of 9 percent, five-year bonds at 104.1 (\$100,000 × 1.041)	

Right after this entry is made, bonds payable would be presented on the balance sheet as follows:

Long-Term Liabilities			
9% Bonds Payable, due 1/1/x5	\$100,000		
Unamortized Bond Premium	<u>4,100</u>	\$104,100	

The carrying value of the bonds payable is \$104,100, which equals the face value of the bonds plus the unamortized bond premium. The cash received from the bond issue is also \$104,100. This means that the purchasers were willing to pay a premium of \$4,100 to buy these bonds because their face interest rate was higher than the market interest rate.

Bond Issue Costs

Most bonds are sold through underwriters, who receive a fee for taking care of the details of marketing the issue or for taking a chance on receiving the selling price. Such costs are connected with the issuance of bonds. Because bond issue costs benefit the whole life of a bond issue, it makes sense to spread the costs over that period. It is generally accepted practice to establish a separate account for bond issue costs and to amortize them over the life of the bonds. However, issue costs decrease the amount of money a company receives from a bond issue. They have the effect, then, of raising the discount or lowering the premium on the issue. As a result, bond issue costs can be spread over the life of the bonds through the amortization of a discount or premium. Because this method simplifies recordkeeping, we assume in the text and problems of this book that all bond issue costs increase the discounts or decrease the premiums of bond issues.

Using Present Value to Value a Bond

OBJECTIVE

4 Use present values to determine the value of bonds




Present value is relevant to the study of bonds because the value of a bond is based on the present value of two components of cash flow: (1) a series of fixed interest payments and (2) a single payment at maturity.* The amount of interest a bond pays is fixed over its life. However, the market interest rate varies from day to day. Thus, the amount investors are willing to pay for a bond changes as well.



Assume, for example, that a particular bond has a face value of \$10,000 and pays fixed interest of \$450 every six months (a 9 percent annual rate). The bond is due in five years. If the market interest rate today is 14 percent, what is the present value of the bond?

To determine the present value of the bond, we use Table 4 in the appendix on future value and present value tables to calculate the present value of the periodic interest payments of \$450, and we use Table 3 in the same appendix to calculate the present value of the single payment of \$10,000 at maturity. Since interest payments are made every six months, the compounding period is half a year. Because of this, it is necessary to convert the annual rate to a semiannual rate of 7 percent (14 percent divided by two six-month periods per year) and to use ten periods

*A knowledge of present value concepts, as presented in the appendix on time value of money, is necessary to an understanding of this section.

FOCUS ON BUSINESS PRACTICE

In 1993, interest rates on long-term debt were at historically low levels, which induced some companies to attempt to lock in those low costs for long periods. One of the most aggressive companies in that regard was  The Walt Disney Company, which issued \$150 million of 100-year bonds at a yield of only 7.5

percent. It was the first time since 1954 that 100-year bonds had been issued. Some analysts wondered if even Mickey Mouse could survive 100 years. Investors who purchase these bonds are taking a financial risk because if interest rates rise, which they are likely to do, then the market value of the bonds will decrease. Since then, other companies, including  The Coca-Cola Company, Columbia HCA Healthcare,  IBM, Bell South, and even the People's Republic of China, have followed suit with 100-year bonds.⁵

(five years multiplied by two six-month periods per year). Using this information, we compute the present value of the bond:

Present value of ten periodic payments at 7 percent (from Table 4 in the appendix on future value and present value tables): $\$450 \times 7.024$	\$3,160.80
Present value of a single payment at the end of ten periods at 7 percent (from Table 3 in the appendix on future value and present value tables): $\$10,000 \times .508$	<u>5,080.00</u>
Present value of \$10,000 bond	<u><u>\$8,240.80</u></u>

The market interest rate has increased so much since the bond was issued (from 9 percent to 14 percent) that the value of the bond is only \$8,240.80 today. That amount is all investors would be willing to pay at this time for a bond that provides income of \$450 every six months and a return of the \$10,000 principal in five years.

If the market interest rate falls below the face interest rate, say to 8 percent (4 percent semiannually), the present value of the bond will be greater than the face value of \$10,000.

Present value of ten periodic payments at 4 percent (from Table 4 in the appendix on future value and present value tables): $\$450 \times 8.111$	\$ 3,649.95
Present value of a single payment at the end of ten periods at 4 percent (from Table 3 in the appendix on future value and present value tables): $\$10,000 \times .676$	<u>6,760.00</u>
Present value of \$10,000 bond	<u><u>\$10,409.95</u></u>

Amortizing a Bond Discount

OBJECTIVE

5 Use the straight-line and effective interest methods to amortize bond discounts and premiums

In the example on page 674, Vason Corporation issued \$100,000 of five-year bonds at a discount because the market interest rate of 10 percent exceeded the face interest rate of 9 percent. The bonds were sold for \$96,149, resulting in an unamortized bond discount of \$3,851. Because this discount affects interest expense in each year of the bond issue, the bond discount should be amortized (reduced gradually) over the life of the issue. This means that the unamortized

bond discount will decrease gradually over time and that the carrying value of the bond issue (face value less unamortized discount) will increase gradually. By the maturity date of the bond, the carrying value of the issue will equal its face value, and the unamortized bond discount will be zero.

Calculation of Total Interest Cost

When bonds are issued at a discount, the effective interest rate paid by the company is greater than the face interest rate on the bonds. The reason is that the interest cost to the company is the stated interest payments *plus* the amount of the bond discount. That is, although the company does not receive the full face value of the bonds on issue, it still must pay back the full face value at maturity. The difference between the issue price and the face value must be added to the total interest payments to arrive at the actual interest expense. The full cost to the corporation of issuing the bonds at a discount is as follows:

Cash to be paid to bondholders	
Face value at maturity	\$100,000
Interest payments ($\$100,000 \times .09 \times 5$ years)	45,000
Total cash paid to bondholders	\$145,000
Less cash received from bondholders	96,149
Total interest cost	<u>\$ 48,851</u> ←
Or, alternatively:	
Interest payments ($\$100,000 \times .09 \times 5$ years)	\$ 45,000
Bond discount	3,851
Total interest cost	<u>\$ 48,851</u> ←

The total interest cost of \$48,851 is made up of \$45,000 in interest payments and the \$3,851 bond discount, so the bond discount increases the interest paid on the bonds from the stated interest rate to the effective interest rate. The *effective interest rate* is the real interest cost of the bond over its life.

For each year's interest expense to reflect the effective interest rate, the discount must be allocated over the remaining life of the bonds as an increase in the interest expense each period. The process of allocation is called *amortization of the bond discount*. Thus, interest expense for each period will exceed the actual payment of interest by the amount of the bond discount amortized over the period.

Some companies and governmental units issue bonds that do not require periodic interest payments. These bonds, called **zero coupon bonds**, are simply a promise to pay a fixed amount at the maturity date. They are issued at a large discount because the only interest earned by the buyer or paid by the issuer is the discount. For example, a five-year, \$100,000 zero coupon bond issued at a time when the market rate is 14 percent, compounded semiannually, would sell for only \$50,800. That amount is the present value of a single payment of \$100,000 at the end of five years. The discount of \$49,200 ($\$100,000 - \$50,800$) is the total interest cost; it is amortized over the life of the bond.

Methods of Amortizing a Bond Discount

There are two ways of amortizing bond discounts or premiums: the straight-line method and the effective interest method.

STRAIGHT-LINE METHOD The **straight-line method** is the easier of the two amortization methods, with equal amortization of the discount for each interest period. Suppose that the interest payment dates for the Vason Corporation bond

issue are January 1 and July 1. The amount of the bond discount amortized and the interest cost for each semiannual period are calculated in four steps.

$$1. \text{ Total Interest Payments} = \text{Interest Payments per Year} \times \text{Life of Bonds} \\ = 2 \times 5 = 10$$

$$2. \text{ Amortization of Bond Discount per Interest Period} = \frac{\text{Bond Discount}}{\text{Total Interest Payments}} \\ = \frac{\$3,851}{10} = \$385^*$$

*Rounded.

$$3. \text{ Cash Interest Payment} = \text{Face Value} \times \text{Face Interest Rate} \times \text{Time} \\ = \$100,000 \times .09 \times \frac{6}{12} = \$4,500$$

$$4. \text{ Interest Cost per Interest Period} = \text{Interest Payment} + \text{Amortization of Bond Discount} \\ = \$4,500 + \$385 = \$4,885$$

On July 1, 20x0, the first semiannual interest date, the entry would be as follows:

20x0	
$\begin{array}{r} A^* = L + OE \\ - \quad + \quad - \\ \text{*Assumes cash paid.} \end{array}$	July 1 Bond Interest Expense 4,885
	Unamortized Bond Discount 385
	Cash (or Interest Payable) 4,500
	Paid (or accrued) semiannual interest
	to bondholders and amortized the discount on 9 percent, five-year bonds

Notice that the bond interest expense is \$4,885, but the amount paid to the bondholders is the \$4,500 face interest payment. The difference of \$385 is the credit to Unamortized Bond Discount. This lowers the debit balance of the Unamortized Bond Discount account and raises the carrying value of the bonds payable by \$385 each interest period. Assuming that no changes occur in the bond issue, this entry will be made every six months for the life of the bonds. When the bond issue matures, there will be no balance in the Unamortized Bond Discount account, and the carrying value of the bonds will be \$100,000—exactly equal to the amount due the bondholders.

The straight-line method has long been used, but it has a certain weakness. Because the carrying value goes up each period and the bond interest expense stays the same, the rate of interest falls over time. Conversely, when the straight-line method is used to amortize a premium, the rate of interest rises over time. Therefore, the Accounting Principles Board has ruled that the straight-line method can be used only when it does not lead to a material difference from the effective interest method.⁶

EFFECTIVE INTEREST METHOD To compute the interest and amortization of a bond discount for each interest period under the **effective interest method**, a constant interest rate is applied to the carrying value of the bonds at the beginning of the interest period. This constant rate equals the market rate, or effective rate, at the time the bonds are issued. The amount to be amortized each period is the difference between the interest computed by using the effective rate and the actual interest paid to bondholders.

As an example, we use the same facts presented earlier—a \$100,000 bond issue at 9 percent, with a five-year maturity and interest to be paid twice a year. The market, or effective, interest rate at the time the bonds were issued was 10 percent. The bonds were sold for \$96,149, a discount of \$3,851. The interest and amortization of the bond discount are shown in Table 1.

Table 1. Interest and Amortization of a Bond Discount: Effective Interest Method

	A	B	C	D	E	F
Semiannual Interest Period	Carrying Value at Beginning of Period	Semiannual Interest Expense at 10% to Be Recorded* (5% × A)	Semiannual Interest to Be Paid to Bondholders (4½% × \$100,000)	Amortization of Bond Discount (B – C)	Unamortized Bond Discount at End of Period (E – D)	Carrying Value at End of Period (A + D)
0					\$3,851	\$ 96,149
1	\$96,149	\$4,807	\$4,500	\$307	3,544	96,456
2	96,456	4,823	4,500	323	3,221	96,779
3	96,779	4,839	4,500	339	2,882	97,118
4	97,118	4,856	4,500	356	2,526	97,474
5	97,474	4,874	4,500	374	2,152	97,848
6	97,848	4,892	4,500	392	1,760	98,240
7	98,240	4,912	4,500	412	1,348	98,652
8	98,652	4,933	4,500	433	915	99,085
9	99,085	4,954	4,500	454	461	99,539
10	99,539	4,961†	4,500	461	—	100,000

*Rounded to the nearest dollar.

†Last period's interest expense equals \$4,961 (\$4,500 + \$461); it does not equal \$4,977 (\$99,539 × .05) because of the cumulative effect of rounding.

The amounts in the table (using period 1) were computed as follows:

Column A The carrying value of the bonds is their face value less the unamortized bond discount (\$100,000 – \$3,851 = **\$96,149**).

Column B The interest expense to be recorded is the effective interest. It is found by multiplying the carrying value of the bonds by the effective interest rate for one-half year ($\$96,149 \times .10 \times \frac{1}{2} = \$4,807$).

Column C The interest paid in the period is a constant amount computed by multiplying the face value of the bonds by their face interest rate by the interest time period ($\$100,000 \times .09 \times \frac{1}{2} = \$4,500$).

Column D The discount amortized is the difference between the effective interest expense to be recorded and the interest to be paid on the interest payment date ($\$4,807 - \$4,500 = \$307$).

Column E The unamortized bond discount is the balance of the bond discount at the beginning of the period less the current period amortization of the discount ($\$3,851 - \$307 = \$3,544$). The unamortized discount decreases each interest payment period because it is amortized as a portion of interest expense.

Column F The carrying value of the bonds at the end of the period is the carrying value at the beginning of the period plus the amortization during the period ($\$96,149 + \$307 = \$96,456$). Notice that the sum of the carrying value and the unamortized discount (Column F + Column E) always equals the face value of the bonds ($\$96,456 + \$3,544 = \$100,000$).

The entry to record the interest expense is exactly like the one used when the straight-line method is applied. However, the amounts debited and credited to the various accounts are different. Using the effective interest method, the entry for July 1, 20x0, would be as follows:

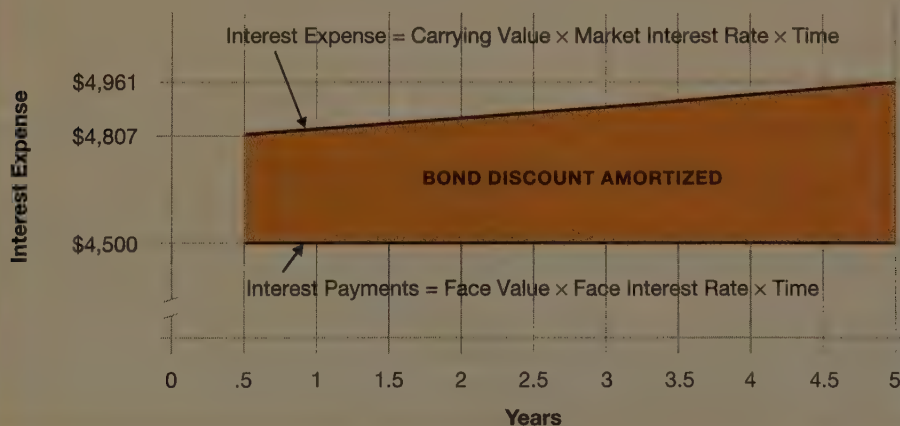
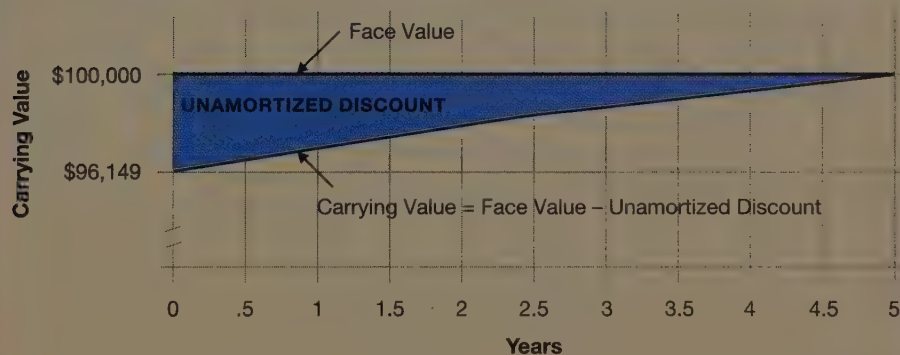
20x0			
$A^* = L + OE$	July 1	Bond Interest Expense	4,807
- + -		Unamortized Bond Discount	307
*Assumes cash paid.		Cash (or Interest Payable)	4,500
		Paid (or accrued) semiannual interest to bondholders and amortized the discount on 9 percent, five-year bonds	

Notice that it is not necessary to prepare an interest and amortization table to determine the amortization of a discount for any one interest payment period. It is necessary only to multiply the carrying value by the effective interest rate and subtract the interest payment from the result. For example, the amount of discount to be amortized in the seventh interest payment period is \$412, calculated as follows: $(\$98,240 \times .05) - \$4,500$.

VISUAL SUMMARY OF THE EFFECTIVE INTEREST METHOD The effect on carrying value and interest expense of the amortization of a bond discount using the effective interest method can be seen in Figure 2 (which is based on the data from Table 1). Notice that initially the carrying value (the issue price) is less than the face value, but that it gradually increases toward the face value over the life of the bond issue.

Notice also that interest expense exceeds interest payments by the amount of the bond discount amortized. Interest expense increases gradually over the life of the bond because it is based on the gradually increasing carrying value (multiplied by the market interest rate).

Figure 2
Carrying Value and Interest
Expense—Bonds Issued at
a Discount



Amortizing a Bond Premium

In our example on pages 674–675, Vason Corporation issued \$100,000 of five-year bonds at a premium because the market interest rate of 8 percent was less than the face interest rate of 9 percent. The bonds were sold for \$104,100, which resulted in an unamortized premium of \$4,100. Like a discount, a premium must be amortized over the life of the bonds so that it can be matched to its effects on interest expense during that period. In the following sections, the total interest cost is calculated and the bond premium is amortized using the straight-line and the effective interest methods.

Calculation of Total Interest Cost

Because the bondholders paid more than face value for the bonds, the premium of \$4,100 (\$104,100 – \$100,000) represents an amount that the bondholders will not receive at maturity. The premium is in effect a reduction, in advance, of the total interest paid on the bonds over the life of the bond issue.

The total interest cost over the issue's life can be computed as follows:

Cash to be paid to bondholders	
Face value at maturity	\$100,000
Interest payments ($\$100,000 \times .09 \times 5$ years)	45,000
Total cash paid to bondholders	\$145,000
Less cash received from bondholders	104,100
Total interest cost	<u>\$ 40,900</u>

Or, alternatively:

Interest payments ($\$100,000 \times .09 \times 5$ years)	\$ 45,000
Less bond premium	4,100
Total interest cost	<u>\$ 40,900</u>

Notice that the total interest payments of \$45,000 exceed the total interest cost of \$40,900 by \$4,100, the amount of the bond premium.

Methods of Amortizing a Bond Premium

The two methods of amortizing a bond premium are the straight-line method and the effective interest method.

STRAIGHT-LINE METHOD Under the straight-line method, the bond premium is spread evenly over the life of the bond issue. As with bond discounts, the amount of the bond premium amortized and the interest cost for each semiannual period are computed in four steps.

$$1. \text{ Total Interest Payments} = \text{Interest Payments per Year} \times \text{Life of Bonds} \\ = 2 \times 5 = 10$$

$$2. \text{ Amortization of Bond Premium per Interest Period} = \frac{\text{Bond Premium}}{\text{Total Interest Payments}} \\ = \frac{\$4,100}{10} = \$410$$

$$3. \text{ Cash Interest Payment} = \text{Face Value} \times \text{Face Interest Rate} \times \text{Time} \\ = \$100,000 \times .09 \times \frac{6}{12} = \$4,500$$

4. Interest Cost per Interest Period = Interest Payment – Amortization of Bond Premium

= \$4,500 – \$410 = \$4,090

On July 1, 20x0, the first semiannual interest date, the entry would be:

A* = L + OE

— — —

*Assumes cash paid.

20x0			
July 1	Bond Interest Expense	4,090	
	Unamortized Bond Premium	410	
	Cash (or Interest Payable)		4,500
	Paid (or accrued) semiannual interest to bondholders and amortized the premium on 9 percent, five-year bonds		

Notice that the bond interest expense is \$4,090, but the amount received by the bondholders is the \$4,500 face interest payment. The difference of \$410 is the debit to Unamortized Bond Premium. This lowers the credit balance of the Unamortized Bond Premium account and the carrying value of the bonds payable by \$410 each interest period. Assuming that the bond issue remains unchanged, the same entry will be made on every semiannual interest date over the life of the bond issue. When the bond issue matures, there will be no balance in the Unamortized Bond Premium account, and the carrying value of the bonds payable will be \$100,000, exactly equal to the amount due the bondholders.

As noted earlier in this chapter, the straight-line method should be used only when it does not lead to a material difference from the effective interest method.

EFFECTIVE INTEREST METHOD Under the straight-line method, the effective interest rate changes constantly, even though the interest expense is fixed, because the effective interest rate is determined by comparing the fixed interest expense with a carrying value that changes as a result of amortizing the discount or premium. To apply a fixed interest rate over the life of the bonds based on the actual market rate at the time of the bond issue requires the use of the effective interest method. Under this method, the interest expense decreases slightly each period (see Table 2, Column B) because the amount of the bond premium amortized increases slightly (Column D). This occurs because a fixed rate is applied each period to the gradually decreasing carrying value (Column A).

The first interest payment is recorded as follows:

A* = L + OE

— — —

*Assumes cash paid.

20x0			
July 1	Bond Interest Expense	4,164	
	Unamortized Bond Premium	336	
	Cash (or Interest Payable)		4,500
	Paid (or accrued) semiannual interest to bondholders and amortized the premium on 9 percent, five-year bonds		

Notice that the unamortized bond premium (Column E) decreases gradually to zero as the carrying value decreases to the face value (Column F). To find the amount of premium amortized in any one interest payment period, subtract the effective interest expense (the carrying value times the effective interest rate, Column B) from the interest payment (Column C). In semiannual interest period 5, for example, the amortization of premium is \$393, calculated as follows: \$4,500 – (\$102,674 × .04).

VISUAL SUMMARY OF THE EFFECTIVE INTEREST METHOD The effect of the amortization of a bond premium using the effective interest method on carrying value and interest expense can be seen in Figure 3 (based on data from Table 2).

Table 2. Interest and Amortization of a Bond Premium: Effective Interest Method

	A	B	C	D	E	F
Semiannual Interest Period	Carrying Value at Beginning of Period	Semiannual Interest Expense at 8% to Be Recorded* (4% × A)	Semiannual Interest to Be Paid to Bondholders (4½% × \$100,000)	Amortization of Bond Premium (C – B)	Unamortized Bond Premium at End of Period (E – D)	Carrying Value at End of Period (A – D)
0					\$4,100	\$104,100
1	\$104,100	\$4,164	\$4,500	\$336	3,764	103,764
2	103,764	4,151	4,500	349	3,415	103,415
3	103,415	4,137	4,500	363	3,052	103,052
4	103,052	4,122	4,500	378	2,674	102,674
5	102,674	4,107	4,500	393	2,281	102,281
6	102,281	4,091	4,500	409	1,872	101,872
7	101,872	4,075	4,500	425	1,447	101,447
8	101,447	4,058	4,500	442	1,005	101,005
9	101,005	4,040	4,500	460	545	100,545
10	100,545	3,955 [†]	4,500	545	—	100,000

*Rounded to the nearest dollar.

[†]Last period's interest expense equals \$3,955 (\$4,500 – \$545); it does not equal \$4,022 (\$100,545 × .04) because of the cumulative effect of rounding.

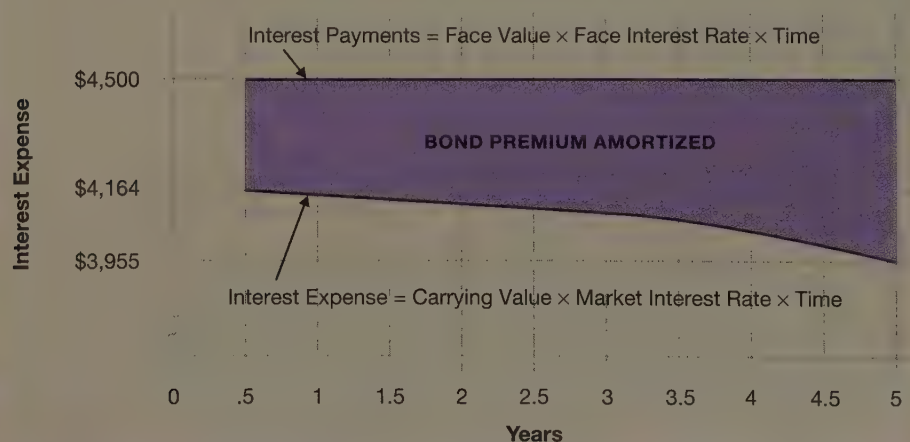
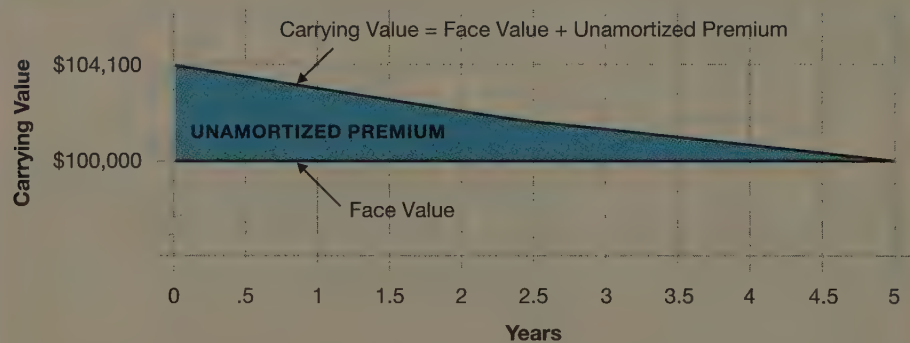


Figure 3
Carrying Value and Interest Expense—Bonds Issued at a Premium

FOCUS ON BUSINESS TECHNOLOGY

Interest and amortization tables like those in Tables 1 and 2 are ideal applications for computer spreadsheet soft-

ware such as Lotus and Microsoft Excel. Once the tables have been constructed with the proper formula in each cell, only five variables must be entered to produce the entire table. The five variables are the face value of the bonds, the selling price, the life of the bonds, the face interest rate, and the effective interest rate.

Notice that initially the carrying value (issue price) is greater than the face value, but that it gradually decreases toward the face value over the life of the bond issue. Notice also that interest payments exceed interest expense by the amount of the premium amortized and that interest expense decreases gradually over the life of the bond because it is based on the gradually decreasing carrying value (multiplied by the market interest rate).

Other Bonds Payable Issues

OBJECTIVE

6 Account for bonds issued between interest dates and make year-end adjustments

Several other issues arise in accounting for bonds payable. Among these issues are the sale of bonds between interest payment dates, the year-end accrual of bond interest expense, the retirement of bonds, and the conversion of bonds into common stock.

Sale of Bonds Between Interest Dates

Bonds may be issued on an interest payment date, as in the previous examples, but they are often issued between interest payment dates. The generally accepted method of handling bonds issued in this manner is to collect from investors the interest that would have accrued for the partial period preceding the issue date. Then, when the first interest period is completed, the corporation pays investors the interest for the entire period. Thus, the interest collected when bonds are sold is returned to investors on the next interest payment date.

There are two reasons for following this procedure. The first is a practical one. If a company issued bonds on several different days and did not collect the accrued interest, records would have to be maintained for each bondholder and date of purchase. In such a case, the interest due each bondholder would have to be computed on the basis of a different time period. Clearly, large bookkeeping costs would be incurred under this kind of system. On the other hand, if accrued interest is collected when the bonds are sold, on the interest payment date the corporation can pay the interest due for the entire period, eliminating the extra computations and costs.

The second reason for collecting accrued interest in advance is that when that amount is netted against the full interest paid on the interest payment date, the resulting interest expense represents the amount for the time the money was borrowed. For example, assume that the Vason Corporation sold \$100,000 of 9 percent, five-year bonds for face value on May 1, 20x0, rather than on January 1, 20x0, the issue date. The entry to record the sale of the bonds is as follows:

		20x0	
A = L + OE + + +	May 1	Cash	103,000
		Bond Interest Expense	3,000
		Bonds Payable	100,000
Sold 9 percent, five-year bonds at face value plus four months' accrued interest $\$100,000 \times .09 \times \frac{4}{12} = \$3,000$			

As shown, Cash is debited for the amount received, \$103,000 (the face value of \$100,000 plus four months' accrued interest of \$3,000). Bond Interest Expense is credited for the \$3,000 of accrued interest, and Bonds Payable is credited for the face value of \$100,000.

When the first semiannual interest payment date arrives, the entry that follows is made:

		20x0	
A* = L + OE - -	July 1	Bond Interest Expense	4,500
		Cash (or Interest Payable)	4,500
		Paid (or accrued) semiannual interest $\$100,000 \times .09 \times \frac{6}{12} = \$4,500$	

*Assumes cash paid.

Notice that the entire half-year interest is both debited to Bond Interest Expense and credited to Cash because the corporation pays bond interest only once every six months, in full six-month amounts. This process is illustrated in Figure 4. The actual interest expense for the two months that the bonds were outstanding is \$1,500. This amount is the net balance of the \$4,500 debit to Bond Interest Expense on July 1 less the \$3,000 credit to Bond Interest Expense on May 1. You can see these steps clearly in the T account for Bond Interest Expense below:

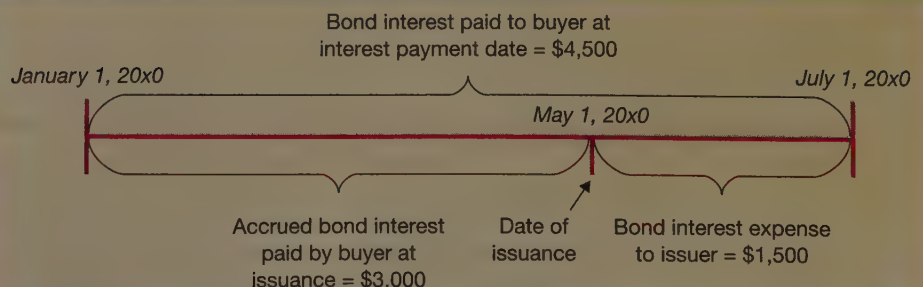
Bond Interest Expense			
Bal.	0	May 1	3,000
July 1	4,500		
Bal.	1,500		

Year-End Accrual for Bond Interest Expense

Bond interest payment dates rarely correspond with a company's fiscal year. Therefore, an adjustment must be made at the end of the accounting period to accrue the interest expense on the bonds from the last payment date to the end of the fiscal year. Further, if there is any discount or premium on the bonds, it must also be amortized for the fractional period.

Remember that in an earlier example, Vason Corporation issued \$100,000 in bonds on January 1, 20x0, at 104.1 (see page 674). Suppose the company's fiscal year ends on September 30, 20x0. In the period since the interest payment and

Figure 4
Effect on Bond Interest Expense When Bonds Are Issued Between Interest Dates



amortization of the premium on July 1, three months' worth of interest has accrued, and the following adjusting entry under the effective interest method must be made:

20x0			
A = L + OE + - - -	Sept. 30	Bond Interest Expense	2,075.50
		Unamortized Bond Premium	174.50
		Interest Payable	2,250.00
		To record accrual of interest on 9 percent bonds payable for three months and amortization of one-half of the premium for the second interest payment period	

This entry covers one-half of the second interest period. Unamortized Bond Premium is debited for \$174.50, which is one-half of \$349, the amortization of the premium for the second period from Table 2. Interest Payable is credited for \$2,250, three months' interest on the face value of the bonds ($\$100,000 \times .09 \times \frac{3}{12}$). The net debit figure of \$2,075.50 ($\$2,250.00 - \174.50) is the bond interest expense for the three-month period.

When the January 1, 20x1, payment date arrives, the entry to pay the bondholders and amortize the premium is as follows:

20x1			
A = L + OE - - - - -	Jan. 1	Bond Interest Expense	2,075.50
		Interest Payable	2,250.00
		Unamortized Bond Premium	174.50
		Cash	4,500.00
		Paid semiannual interest including interest previously accrued, and amortized the premium for the period since the end of the fiscal year	

As shown here, one-half (\$2,250) of the amount paid (\$4,500) was accrued on September 30. Unamortized Bond Premium is debited for \$174.50, the remaining amount to be amortized for the period ($\$349.00 - \174.50). The resulting bond interest expense is the amount that applies to the three-month period from October 1 to December 31.

Bond discounts are recorded at year end in the same way as bond premiums. The difference is that the amortization of a bond discount increases interest expense instead of decreasing it, as a premium does.

Retirement of Bonds

OBJECTIVE

7 Account for the retirement of bonds and the conversion of bonds into stock

Most bond issues give the company a chance to buy back and retire the bonds at a specified **call price**, usually above face value, before maturity. Such bonds are known as **callable bonds**, and give the company flexibility in financing its operations. For example, if bond interest rates drop, the company can call its bonds and reissue debt at a lower interest rate. A company might also call its bonds if it has earned enough to pay off the debt, the reason for having the debt no longer exists, or it wants to restructure its debt to equity ratio. The bond indenture states the time period and the prices at which the bonds can be redeemed. The retirement of a bond issue before its maturity date is called **early extinguishment of debt**.

Let's assume that Vason Corporation can call or retire the \$100,000 of bonds issued at a premium (page 674) at 105 and that it decides to do so on July 1, 20x3. (To simplify the example, the retirement is made on an interest payment date.) Because the bonds were issued on January 1, 20x0, the retirement takes place on the seventh interest payment date. Assume that the entry for the required interest payment and the amortization of the premium has been made. The entry to retire the bonds is as follows:

		20x3		
A = L + OE — — —	July 1	Bonds Payable	100,000	
		Unamortized Bond Premium	1,447	
		Loss on Retirement of Bonds	3,553	
		Cash		105,000
		Retired 9 percent bonds at 105		

In this entry, the cash paid is the face value times the call price ($\$100,000 \times 1.05 = \$105,000$). The unamortized bond premium can be found in Column E of Table 2. The loss on retirement of bonds occurs because the call price of the bonds is greater than the carrying value ($\$105,000 - \$101,447 = \$3,553$). The loss, if material, is presented as an extraordinary item on the income statement.

Sometimes a rise in the market interest rate can cause the market value of bonds to fall considerably below their face value. If it has the cash to do so, the company may find it advantageous to purchase the bonds on the open market and retire them, rather than wait and pay them off at face value. An extraordinary gain is recognized for the difference between the purchase price of the bonds and the carrying value of the retired bonds. For example, assume that because of a rise in interest rates, Vason Corporation is able to purchase the \$100,000 bond issue on the open market at 85, making it unnecessary to call the bonds at the higher price of 105. Then the entry would be as follows:

		20x3		
A = L + OE - - +	July 1	Bonds Payable	100,000	
		Unamortized Bond Premium	1,447	
		Cash		85,000
		Gain on Retirement of Bonds Purchased and retired 9 percent bonds at 85		16,447

Conversion of Bonds into Common Stock

Bonds that can be exchanged for other securities of the corporation (in most cases, common stock) are called **convertible bonds**. Convertibility enables an investor to make more money if the market price of the common stock rises, because the value of the bonds then rises. However, if the common stock price does not rise, the investor still holds the bonds and receives both the periodic interest payments and the principal at the maturity date.

Several factors related to the issuance of convertible bonds are favorable to the company. First, the interest rate is usually less than the company would have to offer if the bonds were not convertible. An investor is willing to give up some current interest for the prospect that the value of the stock will increase, and therefore the value of the bonds will also increase. Another advantage is that management will not have to give up any current control of the company. Unlike stockholders, bondholders do not have voting rights. A third benefit is tax savings. Interest paid on bonds is fully deductible for income tax purposes, whereas cash dividends on common stock are not. Fourth, the company's income will be affected favorably if the company earns a return that exceeds the interest cost of the bonds. Finally, the convertible feature offers financial flexibility. If the market value of the stock rises to a level at which the bond is worth more than face value, management can avoid repaying the bonds by calling them for redemption, thereby forcing the bondholders to convert their bonds into common stock. The bondholders will agree to convert because the common stock they will receive will be worth more than they would receive if the bonds were redeemed.

One major disadvantage of bonds is that interest must be paid semiannually. Inability to make an interest payment could force the company into bankruptcy. Common stock dividends are declared and paid only when the board of directors decides to do so. Another disadvantage is that when the bonds are converted, they

become new outstanding common stock. These new shares give stockholders' rights to the bondholders and reduce the proportional ownership of the existing stockholders.

When a bondholder wishes to convert bonds into common stock, the common stock is recorded at the carrying value of the bonds. The bond liability and the associated unamortized discount or premium are written off the books. For this reason, no gain or loss on the transaction is recorded. For example, suppose that Vason Corporation's bonds are not called on July 1, 20x3. Instead, the corporation's bondholders decide to convert all the bonds to \$8 par value common stock under a convertible provision of 40 shares of common stock for each \$1,000 bond. The entry would be as follows:

		20x3		
A = L + OE - + - +	July 1	Bonds Payable	100,000	
		Unamortized Bond Premium	1,447	
		Common Stock		32,000
		Paid-in Capital in Excess of Par Value, Common		69,447
Converted 9 percent bonds payable into \$8 par value common stock at a rate of 40 shares for each \$1,000 bond				

The unamortized bond premium is found in Column E of Table 2. At a rate of 40 shares for each \$1,000 bond, 4,000 shares will be issued, with a total par value of \$32,000 (4,000 × \$8). The Common Stock account is credited for the amount of the par value of the stock issued. In addition, Paid-in Capital in Excess of Par Value, Common is credited for the difference between the carrying value of the bonds and the par value of the stock issued (\$101,447 − \$32,000 = \$69,447). No gain or loss is recorded.

Other Long-Term Liabilities

OBJECTIVE

8 Explain the basic features of mortgages payable, installment notes payable, long-term leases, and pensions and other postretirement benefits as long-term liabilities

A company may have other long-term liabilities besides bonds. The most common are mortgages payable, installment notes payable, long-term leases, and pensions and other postretirement benefits.

Mortgages Payable

A **mortgage** is a long-term debt secured by real property. It is usually paid in equal monthly installments. Each monthly payment includes interest on the debt and a reduction in the debt. Table 3 shows the first three monthly payments on a \$50,000, 12 percent mortgage. The mortgage was obtained on June 1, and the monthly payments are \$800. According to the table, the entry to record the July 1 payment would be as follows:

A = L + OE - - -	July 1	Mortgage Payable	300	
		Mortgage Interest Expense	500	
		Cash		800
		Made monthly mortgage payment		

Notice from the entry and from Table 3 that the July 1 payment represents interest expense of \$500 (\$50,000 × .12 × ½) and a reduction in the debt of \$300 (\$800 − \$500). Therefore, the unpaid balance is reduced to \$49,700 by the July payment. August's interest expense is slightly less than July's because of the decrease in the debt.

Table 3. Monthly Payment Schedule on a \$50,000, 12 Percent Mortgage

	A	B	C	D	E
Payment Date	Unpaid Balance at Beginning of Period	Monthly Payment	Interest for 1 Month at 1% on Unpaid Balance* (1% × A)	Reduction in Debt (B – C)	Unpaid Balance at End of Period (A – D)
June 1					\$50,000
July 1	\$50,000	\$800	\$500	\$300	49,700
Aug. 1	49,700	800	497	303	49,397
Sept. 1	49,397	800	494	306	49,091

*Rounded to the nearest dollar.

Installment Notes Payable

A long-term note can be paid at its maturity date by making a lump-sum payment that includes the amount borrowed plus the interest. Often, however, the terms of a note will call for a series of periodic payments. Such a note is called an **installment note payable** because each payment includes the interest to date plus a repayment of part of the amount that was borrowed.

For example, let's assume that on December 31, 20x1, \$100,000 is borrowed on a 15 percent installment note, to be paid annually over five years. The entry to record the note is as follows:

20x1				
A = L + OE + + -	Dec. 31	Cash	100,000	
		Notes Payable		100,000
		Borrowed \$100,000 at 15 percent		
		on a five-year installment note		

PAYMENTS OF ACCRUED INTEREST PLUS EQUAL AMOUNTS OF PRINCIPAL Installment notes most often call for payments consisting of accrued interest plus equal amounts of principal repayment. The amount of each installment decreases because the amount of principal on which the accrued interest is owed decreases by the amount of the previous principal payment. Banks use installment notes to finance equipment purchases by businesses; such notes are also common for other kinds of purchases when payment is spread over several years. They can be set up on a revolving basis whereby the borrower can borrow additional funds as the installments are paid. Moreover, the interest rate charged on installment notes may be adjusted periodically as market interest rates change.

On our sample installment note for \$100,000, the principal declines by an equal amount each year for five years, or by \$20,000 per year (\$100,000 ÷ 5 years). The interest is calculated on the balance of the note that remains each year. Because the balance of the note declines each year, the amount of interest declines as well. For example, the entries for the first two payments of the installment note would be as follows:

20x2				
A = L + OE - - -	Dec. 31	Notes Payable	20,000	
		Interest Expense	15,000	
		Cash		35,000
		Made first installment payment on note		
		\$100,000 × .15 = \$15,000		

		20x3		
A = L + OE — — —	Dec. 31	Notes Payable	20,000	
		Interest Expense	12,000	
		Cash		32,000
		Made second installment payment on note $\$80,000 \times .15 = \$12,000$		

Notice that the amount of the payment decreases from \$35,000 to \$32,000 because the amount of interest accrued on the note has decreased from \$15,000 to \$12,000. The difference of \$3,000 is the interest on the \$20,000 that was repaid in 20x2. Each subsequent payment decreases by \$3,000, as the note itself decreases by \$20,000 each year until it is fully paid. This example assumes that the repayment of principal and the interest rate remain the same from year to year.

PAYMENTS OF ACCRUED INTEREST PLUS INCREASING AMOUNTS OF PRINCIPAL

Less commonly, the terms of an installment note, like those used for leasing equipment, may call for equal periodic (monthly or yearly) payments. Under this method, the interest is deducted from the equal payments to determine the amount by which the principal will be reduced each year.

This procedure, presented in Table 4, is similar to that for mortgages, shown in Table 3. Each equal payment of \$29,833 is allocated between interest and principal reduction. Each year the interest is calculated on the remaining principal. As the principal decreases, the annual interest also decreases, and because the payment remains the same, the amount by which the principal decreases becomes larger each year. The entries for the first two years, with data taken from Table 4, follow:

		20x2		
A = L + OE — — —	Dec. 31	Notes Payable	14,833	
		Interest Expense	15,000	
		Cash		29,833
		Made first installment payment on note		
		20x3		
A = L + OE — — —	Dec. 31	Notes Payable	17,058	
		Interest Expense	12,775	
		Cash		29,833
		Made second installment payment on note		

Similar entries will be made for the next three years.

Table 4. Payment Schedule on a \$100,000, 15 Percent Installment Note

	A	B	C	D	E
Payment Date	Unpaid Principal at Beginning of Period	Equal Annual Payment	Interest for 1 Year at 15% on Unpaid Principal* (15% × A)	Reduction in Principal (B – C)	Unpaid Principal at End of Period (A – D)
					\$100,000
20x2	\$100,000	\$29,833	\$15,000	\$14,833	85,167
20x3	85,167	29,833	12,775	17,058	68,109
20x4	68,109	29,833	10,216	19,617	48,492
20x5	48,492	29,833	7,274	22,559	25,933
20x6	25,933	29,833	3,900 [†]	25,933	—

*Rounded to the nearest dollar.

[†]The last year's interest equals \$3,900 (\$29,833 – \$25,933); it does not exactly equal \$3,890 (\$25,933 × .15) because of the cumulative effect of rounding.

How is the equal annual payment calculated? Because the \$100,000 borrowed is the present value of the five equal annual payments at 15 percent interest, it is possible to use present value tables to calculate the annual payments. Using Table 4 from the appendix on future value and present value tables, here is the calculation:

$$\begin{aligned}\text{Periodic Payment} \times \text{Factor (Table 4 in the appendix on future value and present} \\ \text{value tables: 15\%, 5 periods)} &= \text{Present Value} \\ \text{Periodic Payment} \times 3.352 &= \$100,000 \\ \text{Periodic Payment} &= \$100,000 \div 3.352 \\ &= \$29,833\end{aligned}$$

Table 4 shows that five equal annual payments of \$29,833 at 15 percent will reduce the principal balance to zero (except for the discrepancy due to rounding).

Long-Term Leases

There are several ways for a company to obtain new operating assets. One way is to borrow money and buy the asset. Another is to rent the equipment on a short-term lease. A third way is to obtain the equipment on a long-term lease. The first two methods do not create accounting problems. In the first case, the asset and liability are recorded at the amount paid, and the asset is subject to periodic depreciation. In the second case, the lease is short term in relation to the useful life of the asset, and the risks of ownership remain with the owner, called the **lessor**. This type of agreement is called an **operating lease**. It is proper accounting procedure for the renter, called the **lessee**, to treat operating lease payments as an expense and to debit the amount of each monthly payment to Rent Expense.

The third alternative, a long-term lease, is one of the fastest-growing ways of financing operating equipment in the United States today. It has several advantages. For instance, a long-term lease requires no immediate cash payment, and it costs less than a short-term lease. Acquiring the use of plant assets under long-term leases does cause several accounting challenges, however. Often, such leases cannot be canceled. Also, their duration may be about the same as the useful life of the asset. Finally, they may provide for the lessee to buy the asset at a nominal price at the end of the lease. The lease is much like an installment purchase because the risks of ownership are transferred to the lessee. Both the lessee's available assets and its legal obligations (liabilities) increase because the lessee must make a number of payments over the life of the asset.

The Financial Accounting Standards Board has described this kind of long-term lease as a **capital lease**. The term reflects the provisions of such a lease, which make the transaction more like a purchase or sale on installment. The FASB has ruled that in the case of a capital lease, the lessee must record an asset and a long-term liability equal to the present value of the total lease payments during the lease term. In doing so, the lessee must use the present value at the beginning of the lease.⁷ Much like a mortgage payment, each lease payment consists partly of interest expense and partly of repayment of debt. Further, depreciation expense is figured on the asset and entered on the records of the lessee.

Suppose, for example, that Isaacs Company enters into a long-term lease for a machine used in its manufacturing operations. The lease terms call for an annual payment of \$4,000 for six years, which approximates the useful life of the machine (see Table 5). At the end of the lease period, the title to the machine passes to Isaacs. This lease is clearly a capital lease and should be recorded as an asset and a liability according to *FASB Statement No. 13*.

A lease is a periodic payment for the right to use an asset or assets. Present value techniques can be used to place a value on the asset and on the corresponding liability associated with a capital lease. If Isaac's interest cost is 16 percent, the present value of the lease payments can be computed as follows:

Table 5. Payment Schedule on a 16 Percent Capital Lease

	A	B	C	D
Year	Lease Payment	Interest (16%) on Unpaid Obligation* (D × 16%)	Reduction of Lease Obligation (A – B)	Balance of Lease Obligation (D – C)
Beginning				\$14,740
1	\$ 4,000	\$2,358	\$ 1,642	13,098
2	4,000	2,096	1,904	11,194
3	4,000	1,791	2,209	8,985
4	4,000	1,438	2,562	6,423
5	4,000	1,028	2,972	3,451
6	4,000	549 [†]	3,451	—
	<u>\$24,000</u>	<u>\$9,260</u>	<u>\$14,740</u>	

*Computations are rounded to the nearest dollar.

[†]The last year's interest equals \$549 (\$4,000 – \$3,451); it does not exactly equal \$552 (\$3,451 × .16) because of the cumulative effect of rounding.

Periodic Payment × Factor (Table 4 in the appendix on future value and present value tables: 16%, 6 periods) = Present Value

$$\$4,000 \times 3.685 = \$14,740$$

The entry to record the lease contract is as follows:

A = L + OE	Equipment Under Capital Lease	14,740	
+ +	Obligations Under Capital Lease		14,740
	To record capital lease on machinery		

Equipment Under Capital Lease is classified as a long-term asset; Obligations Under Capital Lease is classified as a long-term liability. Each year, Isaacs must record depreciation on the leased asset. Using straight-line depreciation, a six-year life, and no salvage value, the following entry would record the depreciation:

A = L + OE	Depreciation Expense, Equipment		
— —	Under Capital Lease	2,457	
	Accumulated Depreciation, Equipment		
	Under Capital Lease		2,457
	To record depreciation expense on capital lease		

The interest expense for each year is computed by multiplying the interest rate (16 percent) by the amount of the remaining lease obligation. Table 5 shows these calculations. Using the data in the table, the first lease payment would be recorded as follows:

A = L + OE	Interest Expense (Column B)	2,358	
— — —	Obligations Under Capital Lease (Column C)	1,642	
	Cash		4,000
	Made payment on capital lease		

Pensions

Most employees who work for medium- and large-sized companies are covered by some sort of pension plan. A **pension plan** is a contract between a company and its employees in which the company agrees to pay benefits to the employees after

they retire. Many companies contribute the full cost of the pension, but frequently the employees also pay part of their salary or wages toward their pension. The contributions from both parties are typically paid into a **pension fund**, from which benefits are paid to retirees. In most cases, pension benefits consist of monthly payments to retired employees and other payments upon disability or death.

There are two kinds of pension plans. Under a *defined contribution plan*, the employer is required to contribute an annual amount specified by an agreement between the company and its employees or by a resolution of the board of directors. Retirement payments depend on the amount of pension payments the accumulated contributions can support. Under a *defined benefit plan*, the employer's annual contribution is the amount required to fund pension liabilities arising from employment in the current year, but the exact amount will not be determined until the retirement and death of the current employees. Under a defined benefit plan, the amount of future benefits is fixed, but the annual contributions vary depending on assumptions about how much the pension fund will earn. Under a defined contribution plan, each year's contribution is fixed, but the benefits vary depending on how much the pension fund earns.

Accounting for annual pension expense under a defined contribution plan is simple. After the required contribution is determined, Pension Expense is debited and a liability (or Cash) is credited.

Accounting for annual expense under a defined benefit plan is one of the most complex topics in accounting; thus, the intricacies are reserved for advanced courses. In concept, however, the procedure is simple. First, the amount of pension expense is determined. Then, if the amount of cash contributed to the fund is less than the pension expense, a liability results, which is reported on the balance sheet. If the amount of cash paid to the pension plan exceeds the pension expense, a prepaid expense arises and appears on the asset side of the balance sheet. For example, the annual report for Philip Morris Companies, Inc., includes among assets on the balance sheet a prepaid pension of \$1,367 million.⁸

In accordance with the FASB's *Statement No. 87*, all companies should use the same actuarial method to compute pension expense.⁹ However, because of the need to estimate many factors, such as the average remaining service life of active employees, the expected long-run return on pension plan assets, and expected future salary increases, the computation of pension expense is not simple. In addition, actuarial terminology further complicates pension accounting. In nontechnical terms, the pension expense for the year includes not only the cost of the benefits earned by people working during the year but interest costs on the total pension obligation (which are calculated on the present value of future benefits to be paid) and other adjustments. Those costs are reduced by the expected return on the pension fund assets.

All employers whose pension plans do not have sufficient assets to cover the present value of their pension benefit obligations (on a termination basis) must record the amount of the shortfall as a liability on their balance sheets. The investor no longer has to read the notes to the financial statements to learn whether or not the pension plan is fully funded. However, if a pension plan does have sufficient assets to cover its obligations, then no balance sheet reporting is required or permitted.

Other Postretirement Benefits

In addition to pensions, many companies provide health care and other benefits to employees after retirement. In the past, these **other postretirement benefits** were accounted for on a cash basis; that is, they were expensed when the benefits were paid, after an employee had retired. The FASB has concluded, however, that those benefits are earned by the employee, and that, in accordance with the



matching rule, they should be estimated and accrued during the period of time the employee is working.¹⁰

The estimates must take into account assumptions about retirement age, mortality, and, most significantly, future trends in health care benefits. Like pension benefits, such future benefits should be discounted to the current period. In a field test conducted by the Financial Executives Research Foundation, it was determined that the change to accrual accounting increased postretirement benefits by two to seven times the amount recognized on a cash basis.

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

1. Identify the management issues related to issuing long-term debt.

Long-term debt is used to finance long-term assets and business activities that have long-term earnings potential, such as property, plant, and equipment and research and development. In issuing long-term debt, management must decide (1) whether or not to have long-term debt, (2) how much long-term debt to have, and (3) what types of long-term debt to have. Among the advantages of long-term debt financing are that (1) common stockholders do not relinquish any control, (2) interest on debt is tax deductible, and (3) financial leverage may increase earnings. Disadvantages of long-term financing are that (1) interest and principal must be repaid on schedule, and (2) financial leverage can work against a company if a project is not successful.

2. Identify and contrast the major characteristics of bonds.

A bond is a security that represents money borrowed from the investing public. When a corporation issues bonds, it enters into a contract, called a *bond indenture*, with the bondholders. The bond indenture identifies the major conditions of the bonds. A corporation can issue several types of bonds, each having different characteristics. For example, a bond issue may or may not require security (secured versus unsecured bonds). It may be payable at a single time (term bonds) or at several times (serial bonds).

3. Record the issuance of bonds at face value and at a discount or premium.

When bonds are issued, the bondholders pay an amount equal to, less than, or greater than the bonds' face value. Bondholders pay face value for bonds when the interest rate on the bonds approximates the market rate for similar investments. The issuing corporation records the bond issue at face value as a long-term liability in the Bonds Payable account.

Bonds are issued at an amount less than face value when their face interest rate is lower than the market rate for similar investments. The difference between the face value and the issue price is called a *discount* and is debited to Unamortized Bond Discount.

When the face interest rate on bonds is greater than the market interest rate on similar investments, investors are willing to pay more than face value for the bonds. The difference between the issue price and the face value is called a *premium* and is credited to Unamortized Bond Premium.

4. Use present values to determine the value of bonds.

The value of a bond is determined by summing the present values of (a) the series of fixed interest payments of the bond issue and (b) the single payment of the face value at maturity. Tables 3 and 4 in the appendix on future value and present value tables should be used in making these computations.

5. Use the straight-line and effective interest methods to amortize bond discounts and premiums. When bonds are sold at a discount or a premium, the interest rate is adjusted from the face rate to an effective rate that is close to the market rate when the bonds were issued. Therefore, bond discounts or premiums have the effect of increasing or decreasing the interest expense on the bonds over their life. Under these conditions, it is necessary to amortize the discount or premium over the life of the bonds by using either the straight-line method or the effective interest method.

The straight-line method allocates a fixed portion of the bond discount or premium each interest period to adjust the interest payment to interest expense. The effective interest method, which is used when the effects of amortization are material, results in a constant rate of interest on the carrying value of the bonds. To find interest and the amortization of discounts or premiums, the effective interest rate is applied to the carrying value of the bonds (face value minus the discount or plus the premium) at the beginning of the interest period. The amount of the discount or premium to be amortized is the difference between the interest figured by using the effective rate and that obtained by using the face rate. The results of using the effective interest method on bonds issued at a discount or a premium are summarized below and compared with issuance at face value.

	Bonds Issued At		
	Face Value	Discount	Premium
Trend in carrying value over bond term	Constant	Increasing	Decreasing
Trend in interest expense over bond term	Constant	Increasing	Decreasing
Interest expense versus interest payments	Interest expense = interest payments	Interest expense > interest payments	Interest expense < interest payments
Classification of bond discount or premium	Not applicable	Contra-liability (deducted from Bonds Payable)	Liability (added to Bonds Payable)

6. Account for bonds issued between interest dates and make year-end adjustments. When bonds are sold on dates between the interest payment dates, the issuing corporation collects from investors the interest that has accrued since the last interest payment date. When the next interest payment date arrives, the corporation pays the bondholders interest for the entire interest period.

When the end of a corporation's fiscal year does not fall on an interest payment date, the corporation must accrue bond interest expense from the last interest payment date to the end of the company's fiscal year. This accrual results in the inclusion of interest expense on the income statement in the year incurred and interest payable on the balance sheet.

7. Account for the retirement of bonds and the conversion of bonds into stock. Callable bonds can be retired before maturity at the option of the issuing corporation. The call price is usually an amount greater than the face value of the bonds, so the corporation usually recognizes a loss when the bonds

are retired. An extraordinary gain can be recognized on the early extinguishment of debt when a company purchases its bonds on the open market at a price below carrying value. This happens when a rise in the market interest rate causes the market value of the bonds to fall.

Convertible bonds allow the bondholder to convert bonds to stock in the issuing corporation. In this case, the common stock issued is recorded at the carrying value of the bonds being converted. No gain or loss is recognized.

8. Explain the basic features of mortgages payable, installment notes payable, long-term leases, and pensions and other postretirement benefits as long-term liabilities.

A mortgage is a long-term debt secured by real property. It usually is paid in equal monthly installments. Each payment is partly interest expense and partly debt repayment. Installment notes payable are long-term notes that are paid in a series of payments. Part of each payment is interest, and part is repayment of principal. If a long-term lease is a capital lease, the risks of ownership lie with the lessee. Like a mortgage payment, each lease payment is partly interest and partly a reduction of debt. For a capital lease, both an asset and a long-term liability should be recorded. The liability should be equal to the present value at the beginning of the lease of the total lease payments over the lease term. The recorded asset is subject to depreciation. Pension expense must be recorded in the current period. Other postretirement benefits should be estimated and accrued while the employee is still working.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- L02 Bond:** A security, usually long term, representing money borrowed from the investing public by a corporation or some other entity.
- L02 Bond indenture:** A supplementary agreement to a bond issue that defines the rights, privileges, and limitations of bondholders.
- L02 Bond issue:** The total value of bonds issued at one time.
- L07 Callable bonds:** Bonds that an organization can buy back and retire at a call price before maturity.
- L07 Call price:** A specified price, usually above face value, at which a corporation may, at its option, buy back and retire bonds before maturity.
- L08 Capital lease:** A long-term lease in which the risk of ownership lies with the lessee and whose terms resemble a purchase or sale on installment.
- L07 Convertible bonds:** Bonds that can be exchanged for other securities of the corporation, usually its common stock.
- L03 Discount:** The amount by which the face value of a bond exceeds the issue price; occurs when the market interest rate is higher than the face interest rate.
- L07 Early extinguishment of debt:** The retirement of a bond issue before its maturity date.
- L05 Effective interest method:** A method of amortizing bond discounts or premiums that applies a constant interest rate, the market rate at the time the bonds were issued, to the carrying value of the bonds at the beginning of each interest period.
- L03 Face interest rate:** The rate of interest paid to bondholders based on the face value of the bonds.
- L01 Financial leverage:** The ability to increase earnings for stockholders by earning more on assets than is paid in interest on debt incurred to finance the assets; also called *trading on the equity*.
- L08 Installment note payable:** A long-term note paid off in a series of payments, of which part is interest and part is repayment of principal.

- L0 1 Interest coverage ratio:** A measure of the degree of protection a company has from default on interest payments; income before taxes and interest expense divided by interest expense.
- L0 8 Lessee:** The renter who pays rent to use a leased asset legally owned by the lessor.
- L0 8 Lessor:** The legal owner of a leased asset who receives rent for its use from the lessee.
- L0 3 Market interest rate:** The rate of interest paid in the market on bonds of similar risk; also called *effective interest rate*.
- L0 8 Mortgage:** A long-term debt secured by real property; usually paid in equal monthly installments, of which part is interest and part is repayment of principal.
- L0 8 Operating lease:** A short-term or cancelable lease in which the risks of ownership lie with the lessor, and whose payments are recorded by the lessee as a rent expense.
- L0 8 Other postretirement benefits:** Health care and other nonpension benefits paid to a worker after retirement but earned while the employee is still working.
- L0 8 Pension fund:** A fund established through contributions from an employer (and, sometimes, employees) from which payments are made to employees after retirement or on disability or death.
- L0 8 Pension plan:** A contract between a company and its employees under which the company agrees to pay benefits to the employees after they retire.
- L0 3 Premium:** The amount by which the issue price of a bond exceeds its face value; occurs when the market interest rate is lower than the face interest rate.
- L0 2 Secured bonds:** Bonds that give the bondholders a pledge of certain assets as a guarantee of repayment.
- L0 2 Serial bonds:** A bond issue with several different maturity dates.
- L0 5 Straight-line method:** A method of amortizing bond discounts or premiums that allocates the discount or premium equally over each interest period of the life of a bond.
- L0 2 Term bonds:** Bonds of a bond issue that all mature at the same time.
- L0 2 Unsecured bonds:** Bonds issued on the general credit of an organization; also called *debenture bonds*.
- L0 5 Zero coupon bonds:** Bonds that do not pay periodic interest but that promise to pay a fixed amount on the maturity date.

REVIEW PROBLEM

Interest and Amortization of a Bond Discount, Bond Retirement, and Bond Conversion

- L0 3** When the Merrill Manufacturing Company was expanding its metal window division, it did not have enough capital to finance the expansion. So management sought and received approval from the board of directors to issue bonds. Merrill Manufacturing planned to issue \$5,000,000 of 8 percent, five-year bonds in 20x1. Interest would be paid on June 30 and December 31 of each year. The bonds would be callable at 104, and each \$1,000 bond would be convertible into 30 shares of \$10 par value common stock.

On January 1, 20x1, the bonds were sold at 96 because the market rate of interest for similar investments was 9 percent. Merrill Manufacturing decided to amortize the bond discount by using the effective interest method. On July 1, 20x3, management called and retired half the bonds, and investors converted the other half into common stock.

REQUIRED

1. Prepare an interest and amortization schedule for the first five interest periods.
2. Prepare the journal entries to record the sale of the bonds, the first two interest payments, the bond retirement, and the bond conversion.

ANSWER TO REVIEW PROBLEM

1. Prepare a schedule for the first five interest periods.

Interest and Amortization of Bond Discount

Semiannual Interest Payment Date	Carrying Value at Beginning of Period	Semiannual Interest Expense* (9% × ½)	Semiannual Interest Paid per Period (8% × ½)	Amortiza- tion of Discount	Unamortized Bond Discount at End of Period	Carrying Value at End of Period
Jan. 1, 20x1					\$200,000	\$4,800,000
June 30, 20x1	\$4,800,000	\$216,000	\$200,000	\$16,000	184,000	4,816,000
Dec. 31, 20x1	4,816,000	216,720	200,000	16,720	167,280	4,832,720
June 30, 20x2	4,832,720	217,472	200,000	17,472	149,808	4,850,192
Dec. 31, 20x2	4,850,192	218,259	200,000	18,259	131,549	4,868,451
June 30, 20x3	4,868,451	219,080	200,000	19,080	112,469	4,887,531

*Rounded to the nearest dollar.

2. Prepare the journal entries.

20x1

Jan. 1	Cash	4,800,000	
	Unamortized Bond Discount	200,000	
	Bonds Payable		5,000,000
	Sold \$5,000,000 of 8 percent, five-year bonds at 96		
June 30	Bond Interest Expense	216,000	
	Unamortized Bond Discount		16,000
	Cash		200,000
	Paid semiannual interest and amortized the discount on 8 percent, five-year bonds		
Dec. 31	Bond Interest Expense	216,720	
	Unamortized Bond Discount		16,720
	Cash		200,000
	Paid semiannual interest and amortized the discount on 8 percent, five-year bonds		

20x3

July 1	Bonds Payable	2,500,000	
	Loss on Retirement of Bonds	156,235	
	Unamortized Bond Discount		56,235
	Cash		2,600,000
	Called \$2,500,000 of 8 percent bonds and retired them at 104 \$112,469 \times $\frac{1}{2}$ = \$56,235*		

*Rounded.

July 1	Bonds Payable	2,500,000	
	Unamortized Bond Discount		56,234
	Common Stock		750,000
	Paid-in Capital in Excess of Par Value, Common		1,693,766
	Converted \$2,500,000 of 8 percent bonds into common stock:		
	$2,500 \times 30 \text{ shares} = 75,000 \text{ shares}$		
	$75,000 \text{ shares} \times \$10 = \$750,000$		
	$\$112,469 - \$56,235 = \$56,234$		
	$\$2,500,000 - (\$56,234 + \$750,000) = \$1,693,766$		

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. What are the advantages and disadvantages of issuing long-term debt?
2. What are a bond issue and a bond indenture? What information is found in a bond indenture?
3. What are the essential differences between (a) secured and debenture bonds, and (b) term and serial bonds?
4. Napier Corporation sold \$500,000 of 5 percent, \$1,000 bonds on the interest payment date. What would the proceeds from the sale be if the bonds were issued at 95, at 100, and at 102?
5. If you were about to buy bonds on which the face interest rate was less than the market interest rate, would you expect to pay more or less than par value for the bonds?
6. Why does the amortization of a bond discount increase interest expense to an amount greater than interest paid? Why does the amortization of a premium have the opposite effect?
7. When the effective interest method of amortizing a bond discount or premium is used, why does the amount of interest expense change from period to period?
8. When bonds are issued between interest dates, why is it necessary for the issuer to collect an amount equal to accrued interest from the buyer?
9. Why would a company want to exercise the call provision of a bond when it can wait to pay off the debt?
10. What are the advantages of convertible bonds to the company issuing them and to the investor?
11. What are the two components of a uniform monthly mortgage payment?
12. What are the two methods of repaying an installment note?
13. Under what conditions is a long-term lease called a capital lease? Why should an accountant record both an asset and a liability in connection with this type of lease? What items should appear on the income statement as the result of a capital lease?
14. What is a pension plan? What is a pension fund?
15. What is the difference between a defined contribution plan and a defined benefit plan? In general, how is expense determined under each plan? What assumptions must be made to account for the expenses of such a plan?
16. What are other postretirement benefits, and how is the matching rule applied?

SHORT EXERCISES

- LO 1 Bond Versus Common Stock Financing**
- SE 1.** Indicate whether each of the following is an advantage or a disadvantage of using long-term bond financing rather than issuing common stock.
1. Interest paid on bonds is tax deductible.
 2. Sometimes projects are not as successful as planned.
 3. Financial leverage can have a negative effect when investments do not earn as much as the interest payments on the related debt.
 4. Bondholders do not have voting rights in a corporation.
 5. Positive financial leverage may be achieved.
- LO 3 Journal Entries for Interest Using the Straight-Line Method**
- SE 2.** On April 1, 20x1, Taylor Corporation issued \$4,000,000 in 8.5 percent, five-year bonds at 98. The semiannual interest payment dates are April 1 and October 1. Prepare journal entries for the issue of the bonds by Taylor on April 1, 20x1, and the first two interest payments on October 1, 20x1, and April 1, 20x2. Use the straight-line method and ignore year-end accruals.
- LO 3 Journal Entries for Interest Using the Effective Interest Method**
- SE 3.** On March 1, 20xx, River Front Freight Company sold \$100,000 of its 9.5 percent, 20-year bonds at 106. The semiannual interest payment dates are March 1 and September 1. The effective interest rate is approximately 8.9 percent. The company's fiscal year ends August 31. Prepare journal entries to record the sale of the bonds on March 1, the accrual of interest and amortization of premium on August 31, and the first interest payment on September 1. Use the effective interest method to amortize the premium.
- LO 4 Valuing Bonds Using Present Value**
- SE 4.** Mine-Mart, Inc., is considering the sale of two bond issues. Choice A is a \$400,000 bond issue that pays semiannual interest of \$32,000 and is due in 20 years. Choice B is a \$400,000 bond issue that pays semiannual interest of \$30,000 and is due in 15 years. Assume that the market rate of interest for each bond is 12 percent. Calculate the amount that Mine-Mart, Inc., will receive if both bond issues occur. (Calculate the present value of each bond issue and sum.)
- LO 3 Journal Entries for Bond Issues**
- SE 5.** Macrofilm Company is authorized to issue \$900,000 in bonds on June 1. The bonds carry a face interest rate of 8 percent, with interest to be paid on June 1 and December 1. Prepare journal entries for the issue of the bonds under the independent assumptions that (a) the bonds are issued on September 1 at 100 and (b) the bonds are issued on June 1 at 103.
- LO 6 Sale of Bonds Between Interest Dates**
- SE 6.** Tripp Corporation sold \$200,000 of 9 percent, ten-year bonds for face value on September 1, 20xx. The issue date of the bonds was May 1, 20xx. The company's fiscal year ends on December 31, and this is its only bond issue. Record the sale of the bonds on September 1 and the first semiannual interest payment on November 1, 20xx. What is the bond interest expense for the year ended December 31, 20xx?
- LO 3 Year-End Accrual of Bond Interest**
- SE 7.** On October 1, 20x1, Alexis Corporation issued \$500,000 of 9 percent bonds at 96. The bonds are dated October 1 and pay interest semiannually. The market rate of interest is 10 percent, and the company's year end is December 31. Prepare the entries to record the issuance of the bonds, the accrual of the interest on December 31, 20x1, and the payment of the first semiannual interest on April 1, 20x2. Assume that the company does not use reversing entries and uses the effective interest method to amortize the bond discount.
- LO 7 Journal Entry for Bond Retirement**
- SE 8.** The Falstaf Corporation has outstanding \$800,000 of 8 percent bonds callable at 104. On December 1, immediately after the payment of the semiannual interest and the amortization of the bond discount were recorded, the unamortized bond discount equaled \$21,000. On that date, \$480,000 of the bonds were called and retired. Prepare the entry to record the retirement of the bonds on December 1.
- LO 7 Journal Entry for Bond Conversion**
- SE 9.** The Degas Corporation has \$1,000,000 of 6 percent bonds outstanding. There is \$20,000 of unamortized discount remaining on the bonds after the March 1, 20x2, semiannual interest payment. The bonds are convertible at the rate of 20 shares of \$10

par value common stock for each \$1,000 bond. On March 1, 20x2, bondholders presented \$600,000 of the bonds for conversion. Prepare the journal entry to record the conversion of the bonds.

LO 8 Mortgage Payable

- SE 10.** Sternberg Corporation purchased a building by signing a \$300,000 long-term mortgage with monthly payments of \$2,400. The mortgage carries an interest rate of 8 percent. Prepare a monthly payment schedule showing the monthly payment, the interest for the month, the reduction in debt, and the unpaid balance for the first three months. (Round to the nearest dollar.)

EXERCISES

LO 1 Interest Coverage Ratio

- E 1.** Compute the interest coverage ratios for 20x1 and 20x2 from the partial income statements of Treefarm Company:

	20x2	20x1
Income from operations	\$23,890	\$18,460
Interest expense	5,800	3,300
Income before income taxes	\$18,090	\$15,160
Income taxes	5,400	4,500
Net income	<u>\$12,690</u>	<u>\$10,660</u>

LO 3 Journal Entries for LO 5 Interest Using the Straight-Line Method

- E 2.** Mizray Corporation issued \$4,000,000 in 10.5 percent, ten-year bonds on February 1, 20x1, at 104. The semiannual interest payment dates are February 1 and August 1. Prepare journal entries for the issue of bonds by Mizray on February 1, 20x1, and the first two interest payments on August 1, 20x1, and February 1, 20x2. Use the straight-line method and ignore year-end accruals.

LO 3 Journal Entries for LO 5 Interest Using the Straight-Line Method

- E 3.** Collins Corporation issued \$8,000,000 in 8.5 percent, five-year bonds on March 1, 20x1, at 96. The semiannual interest payment dates are March 1 and September 1. Prepare journal entries for the issue of the bonds by Collins on March 1, 20x1, and the first two interest payments on September 1, 20x1, and March 1, 20x2. Use the straight-line method and ignore year-end accruals.

LO 3 Journal Entries for LO 5 Interest Using the LO 6 Effective Interest Method

- E 4.** The Wooden Toy Company sold \$500,000 of 9.5 percent, 20-year bonds on April 1, 20xx, at 106. The semiannual interest payment dates are April 1 and October 1. The effective interest rate is approximately 8.9 percent. The company's fiscal year ends September 30. Prepare journal entries to record the sale of the bonds on April 1, the accrual of interest and amortization of premium on September 30, and the first interest payment on October 1. Use the effective interest method to amortize the premium.

LO 3 Journal Entries for LO 5 Interest Using the LO 6 Effective Interest Method

- E 5.** On March 1, 20x1, the Herring Corporation issued \$1,200,000 of 10 percent, five-year bonds. The semiannual interest payment dates are March 1 and September 1. Because the market rate for similar investments was 11 percent, the bonds had to be issued at a discount. The discount on the issuance of the bonds was \$48,670. The company's fiscal year ends February 28. Prepare journal entries to record the bond issue on March 1, 20x1; the payment of interest and the amortization of the discount on September 1, 20x1; the accrual of interest and the amortization of the discount on February 28, 20x2; and the payment of interest on March 1, 20x2. Use the effective interest method. (Round answers to the nearest dollar.)

LO 4 Valuing Bonds Using Present Value

- E 6.** Kitchens, Inc., is considering the sale of two bond issues. Choice A is an \$800,000 bond issue that pays semiannual interest of \$64,000 and is due in 20 years. Choice B is an \$800,000 bond issue that pays semiannual interest of \$60,000 and is due in 15 years. Assume that the market interest rate for each bond is 12 percent.

Calculate the amount that Kitchens, Inc., will receive if both bond issues are made. (Hint: Calculate the present value of each bond issue and sum.)

LO 4 Valuing Bonds Using Present Value

- E 7.** Use the present value tables in the appendix on future value and present value tables to calculate the issue price of a \$1,200,000 bond issue in each of the following independent cases, assuming that interest is paid semiannually:
- A ten-year, 8 percent bond issue; the market interest rate is 10 percent.
 - A ten-year, 8 percent bond issue; the market interest rate is 6 percent.
 - A ten-year, 10 percent bond issue; the market interest rate is 8 percent.
 - A 20-year, 10 percent bond issue; the market interest rate is 12 percent.
 - A 20-year, 10 percent bond issue; the market interest rate is 6 percent.

LO 4 Zero Coupon Bonds

- E 8.** The state of Arkansas needs to raise \$100,000,000 for highway repairs. Officials are considering issuing zero coupon bonds, which do not require periodic interest payments. The current market interest rate for the bonds is 10 percent. What face value of bonds must be issued to raise the needed funds, assuming the bonds will be due in 30 years and compounded annually? How would your answer change if the bonds were due in 50 years? How would both answers change if the market interest rate were 8 percent instead of 10 percent?

LO 5 Journal Entries for Interest Payments Using the Effective Interest Method

- E 9.** The long-term debt section of the Garcia Corporation's balance sheet at the end of its fiscal year, December 31, 2001, was as follows:

Long-Term Liabilities

Bonds Payable—8 percent, interest payable		
1/1 and 7/1, due 12/31/13	\$1,000,000	
Less Unamortized Bond Discount	<u>80,000</u>	\$920,000

Prepare the journal entries relevant to the interest payments on July 1, 2002, December 31, 2002, and January 1, 2003. Assume an effective interest rate of 10 percent.

LO 3 Journal Entries for Bond Issue

- E 10.** Speaker Symphonics, Inc., is authorized to issue \$1,800,000 in bonds on June 1. The bonds carry a face interest rate of 9 percent, which is to be paid on June 1 and December 1.

Prepare journal entries for the issue of the bonds by Speaker Symphonics, Inc., under the assumptions that (a) the bonds are issued on September 1 at 100 and (b) the bonds are issued on June 1 at 105.

LO 6 Sale of Bonds Between Interest Dates

- E 11.** Daniel Corporation sold \$400,000 of 12 percent, ten-year bonds at face value on September 1, 20xx. The issue date of the bonds was May 1, 20xx.

- Record the sale of the bonds on September 1 and the first semiannual interest payment on November 1, 20xx.
- The company's fiscal year ends on December 31 and this is its only bond issue. What is the bond interest expense for the year ended December 31, 20xx?

LO 3 Year-End Accrual of Bond Interest

- E 12.** Sao Corporation issued \$1,000,000 of 9 percent bonds on October 1, 20x1, at 96. The bonds are dated October 1 and pay interest semiannually. The market interest rate is 10 percent, and the company's fiscal year ends on December 31.

Prepare the entries to record the issuance of the bonds, the accrual of the interest on December 31, 20x1, and the first semiannual interest payment on April 1, 20x2. Assume the company does not use reversing entries and uses the effective interest method to amortize the bond discount.

LO 4 Time Value of Money and LO 7 Early Extinguishment of Debt

- E 13.** Rupp, Inc., has a \$1,400,000, 8 percent bond issue that was issued a number of years ago at face value. There are now ten years left on the bond issue, and the market interest rate is 16 percent. Interest is paid semiannually.

- Using present value tables, figure the current market value of the bond issue.
- Record the retirement of the bonds, assuming the company purchases the bonds on the open market at the calculated value.

LO 7 Journal Entry for Bond Retirement

- E 14.** The Berman Corporation has outstanding \$1,600,000 of 8 percent bonds callable at 104. On September 1, immediately after recording the payment of the semiannual interest and the amortization of the discount, the unamortized bond discount equaled \$42,000. On that date, \$960,000 of the bonds were called and retired.

Prepare the entry to record the retirement of the bonds on September 1.

LO 7 Journal Entry for Bond Conversion

- E 15.** The Imaoka Corporation has \$400,000 of 6 percent bonds outstanding. There is \$20,000 of unamortized discount remaining on these bonds after the July 1, 20x8, semiannual interest payment. The bonds are convertible at the rate of 40 shares of \$5 par value common stock for each \$1,000 bond. On July 1, 20x8, bondholders presented \$300,000 of the bonds for conversion.

Prepare the journal entry to record the conversion of the bonds.

LO 8 Mortgage Payable

- E 16.** Stars Corporation purchased a building by signing a \$150,000 long-term mortgage with monthly payments of \$2,000. The mortgage carries an interest rate of 12 percent.

1. Prepare a monthly payment schedule showing the monthly payment, the interest for the month, the reduction in debt, and the unpaid balance for the first three months. (Round to the nearest dollar.)
2. Prepare journal entries to record the purchase and the first two monthly payments.

LO 8 Recording Lease Obligations

- E 17.** Island Corporation has leased a piece of equipment that has a useful life of 12 years. The terms of the lease are \$43,000 per year for 12 years. Island currently is able to borrow money at a long-term interest rate of 15 percent. (Round answers to the nearest dollar.)

1. Calculate the present value of the lease.
2. Prepare the entry to record the lease agreement.
3. Prepare the entry to record depreciation of the equipment for the first year using the straight-line method.
4. Prepare the entries to record the lease payments for the first two years.

LO 8 Installment Notes Payable: Unequal Payments

- E 18.** Assume that on December 31, 20x1, \$40,000 is borrowed on a 12 percent installment note, to be paid annually over four years. Prepare the entry to record the note and the first two annual payments, assuming that the principal is paid in equal annual installments and the interest on the unpaid balance accrues annually. How would your answer change if the interest rate rose to 13 percent in 20x3?

LO 8 Installment Notes Payable: Equal Payments

- E 19.** Assume that on December 31, 20x1, \$40,000 is borrowed on a 12 percent installment note, to be paid in equal annual payments over four years. Calculate to the nearest dollar the amount of each equal payment, using Table 4 from the appendix on future value and present value tables. Prepare a payment schedule table similar to Table 4 in the text, and record the first two annual payments.

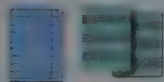
**LO 3 Bond Transactions—
LO 5 Straight-Line Method
LO 6****PROBLEMS**

- P 1.** Abel Corporation has \$10,000,000 of 10.5 percent, 20-year bonds dated June 1, with interest payment dates of May 31 and November 30. The company's fiscal year ends on December 31. It uses the straight-line method to amortize bond premiums or discounts.

1. Assume the bonds are issued at 103 on June 1. Prepare journal entries for June 1, November 30, and December 31.
2. Assume the bonds are issued at 97 on June 1. Prepare journal entries for June 1, November 30, and December 31.
3. Assume the bonds are issued at face value plus accrued interest on August 1. Prepare journal entries for August 1, November 30, and December 31.

- P 2.** Julio Corporation has \$8,000,000 of 9.5 percent, 25-year bonds dated March 1, with interest payable on March 1 and September 1. The company's fiscal year ends on November 30. It uses the effective interest method to amortize bond premiums or discounts. (Round amounts to the nearest dollar.)

1. Assume the bonds are issued at 102.5 on March 1 to yield an effective interest rate of 9.2 percent. Prepare journal entries for March 1, September 1, and November 30.
2. Assume the bonds are issued at 97.5 on March 1 to yield an effective interest rate of 9.8 percent. Prepare journal entries for March 1, September 1, and November 30.

REQUIRED**LO 3 Bond Transactions—
LO 5 Effective Interest
LO 6 Method****REQUIRED**

3. Assume the bonds are issued on June 1 at face value plus accrued interest. Prepare journal entries for June 1, September 1, and November 30.

LO 3 Bonds Issued at a
LO 5 Discount and a Premium



- P 3.** Waxman Corporation issued bonds twice during 20x2. A summary of the transactions involving the bonds follows.

20x2

- Jan. 1 Issued \$6,000,000 of 9.9 percent, ten-year bonds dated January 1, 20x2, with interest payable on June 30 and December 31. The bonds were sold at 102.6, resulting in an effective interest rate of 9.4 percent.
- Mar. 1 Issued \$4,000,000 of 9.2 percent, ten-year bonds dated March 1, 20x2, with interest payable March 1 and September 1. The bonds were sold at 98.2, resulting in an effective interest rate of 9.5 percent.
- June 30 Paid semiannual interest on the January 1 issue and amortized the premium, using the effective interest method.
- Sept. 1 Paid semiannual interest on the March 1 issue and amortized the discount, using the effective interest method.
- Dec. 31 Paid semiannual interest on the January 1 issue and amortized the premium, using the effective interest method.
- 31 Made an end-of-year adjusting entry to accrue interest on the March 1 issue and to amortize two-thirds of the discount applicable to the second interest period.

20x3

- Mar. 1 Paid semiannual interest on the March 1 issue and amortized the remainder of the discount applicable to the second interest period.

REQUIRED

Prepare journal entries to record the bond transactions. (Round amounts to the nearest dollar.)

LO 3 Bond Interest and
LO 5 Amortization Table
LO 7 and Bond Retirements



REQUIRED

- P 4.** In 20x1, the Fender Corporation was authorized to issue \$60,000,000 of six-year unsecured bonds. The bonds carried a face interest rate of 9 percent, payable semiannually on June 30 and December 31. The bonds were callable at 105 any time after June 30, 20x4. All of the bonds were issued on July 1, 20x1, at 95.568, a price yielding an effective interest rate of 10 percent. On July 1, 20x4, the company called and retired half the outstanding bonds.

1. Prepare a table similar to Table 1 to show the interest and amortization of the bond discount for 12 interest payment periods, using the effective interest method. (Round results to the nearest dollar.)
2. Calculate the amount of loss on early retirement of one-half of the bonds on July 1, 20x4.

- P 5.** The Katz Corporation, a company whose fiscal year ends on June 30, engaged in the following long-term bond transactions over a three-year period:

20x3

- Nov. 1 Issued \$40,000,000 of 12 percent debenture bonds at face value plus accrued interest. Interest is payable on January 31 and July 31, and the bonds are callable at 104.

20x4

- Jan. 31 Made the semiannual interest payment on the 12 percent bonds.
- June 30 Made the year-end accrual of interest payment on the 12 percent bonds.
- July 1 Issued \$20,000,000 of 10 percent, 15-year convertible bonds at 105. Interest is payable on June 30 and December 31, and each \$1,000 bond is convertible into 30 shares of \$10 par value common stock. The market rate of interest is 9 percent.
- 31 Made the semiannual interest payment on the 12 percent bonds.
- Dec. 31 Made the semiannual interest payment on the 10 percent bonds and amortized the bond premium.

LO 3 Comprehensive
LO 5 Bond Transactions



20x5

- Jan. 31 Made the semiannual interest payment on the 12 percent bonds.
 Feb. 28 Called and retired all of the 12 percent bonds, including accrued interest.
 June 30 Made the semiannual interest payment on the 10 percent bonds and amortized the bond premium.
 July 1 Accepted for conversion into common stock all of the 10 percent bonds.

REQUIRED

Prepare journal entries to record the bond transactions, making all necessary accruals and using the effective interest method. (Round all calculations to the nearest dollar.)

ALTERNATE PROBLEMS

- P 6.** Bassi Corporation has \$8,000,000 of 9.5 percent, 25-year bonds dated March 1, with interest payable on March 1 and September 1. The company's fiscal year ends on November 30, and it uses the straight-line method to amortize bond premiums or discounts.

1. Assume the bonds are issued at 103.5 on March 1. Prepare journal entries for March 1, September 1, and November 30.
2. Assume the bonds are issued at 96.5 on March 1. Prepare journal entries for March 1, September 1, and November 30.
3. Assume the bonds are issued on June 1 at face value plus accrued interest. Prepare journal entries for June 1, September 1, and November 30.

- P 7.** Khan Corporation has \$20,000,000 of 10.5 percent, 20-year bonds dated June 1, with interest payment dates of May 31 and November 30. The company's fiscal year ends December 31. It uses the effective interest method to amortize bond premiums or discounts. (Round amounts to the nearest dollar.)

1. Assume the bonds are issued at 103 on June 1 to yield an effective interest rate of 10.1 percent. Prepare journal entries for June 1, November 30, and December 31.
2. Assume the bonds are issued at 97 on June 1 to yield an effective interest rate of 10.9 percent. Prepare journal entries for June 1, November 30, and December 31.
3. Assume the bonds are issued at face value plus accrued interest on August 1. Prepare journal entries for August 1, November 30, and December 31.

- P 8.** Pakesh Corporation issued bonds twice during 20x1. The transactions were as follows:

20x1

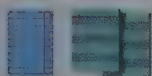
- Jan. 1 Issued \$2,000,000 of 9.2 percent, ten-year bonds dated January 1, 20x1, with interest payable on June 30 and December 31. The bonds were sold at 98.1, resulting in an effective interest rate of 9.5 percent.
 Apr. 1 Issued \$4,000,000 of 9.8 percent, ten-year bonds dated April 1, 20x1, with interest payable on March 31 and September 30. The bonds were sold at 102, resulting in an effective interest rate of 9.5 percent.
 June 30 Paid semiannual interest on the January 1 issue and amortized the discount, using the effective interest method.
 Sept. 30 Paid semiannual interest on the April 1 issue and amortized the premium, using the effective interest method.
 Dec. 31 Paid semiannual interest on the January 1 issue and amortized the discount, using the effective interest method.
 31 Made an end-of-year adjusting entry to accrue interest on the April 1 issue and to amortize half the premium applicable to the second interest period.

20x2

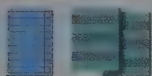
- Mar. 31 Paid semiannual interest on the April 1 issue and amortized the premium applicable to the second half of the second interest period.

Prepare journal entries to record the bond transactions. (Round amounts to the nearest dollar.)

LO 3 Bond Transactions—
LO 5 Straight-Line Method
LO 6

REQUIRED

LO 3 Bond Transactions—
LO 5 Effective Interest Method
LO 6

REQUIRED

LO 3 Bonds Issued at a
LO 5 Discount and a Premium
LO 6

**REQUIRED**

EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

LO 3 Bond Interest Rates and Market Prices



- SD 1.** *R.J. Reynolds Tobacco Holdings, Inc.*, is one of the largest tobacco companies. Among its long-term debts is a bond due in 2013 that carries a face interest rate of 9½ percent. Recently this bond sold on the New York Stock Exchange at 113. Does this bond sell at a discount or a premium? Assuming the bond was originally issued at face value, have interest rates risen or declined since the date of issue? Do you expect the market rate of interest on this bond to be more or less than 9½ percent? Does the current market price affect either the amount that the company pays in semiannual interest or the amount of interest expense for the same period? Explain your answers.

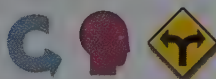
LO 8 Lease Financing



- SD 2.** *Federal Express Corporation*, known for overnight delivery and distribution of high-priority goods and documents throughout the world, has an extensive fleet of aircraft and vehicles. In its 1999 annual report, the company stated that it "utilizes certain aircraft, land, facilities, and equipment under capital and operating leases which expire at various dates through 2025. In addition, supplemental aircraft are leased under agreements which generally provide for cancellation upon 30 days' notice." The annual report further stated that the minimum commitments for capital leases and non-cancelable operating leases for 2000 were \$15,023,000 and \$1,011,957,000, respectively.¹¹ What is the difference between a capital lease and an operating lease? How do the accounting procedures for the two types of leases differ? How do you interpret management's reasoning in placing some aircraft under capital leases and others under operating leases? Why do you think the management of FedEx leases most of its aircraft instead of buying them?

Ethical Dilemma

LO 2 Bond Indenture and Ethical Reporting



- SD 3.** *Celltech Corporation*, a biotech company, has a \$24,000,000 bond issue outstanding that has several restrictive provisions in its bond indenture. Among them are requirements that current assets exceed current liabilities by a ratio of 2 to 1 and that income before income taxes exceed the annual interest on the bonds by a ratio of 3 to 1. If those requirements are not met, the bondholders can force the company into bankruptcy. The company is still awaiting Food and Drug Administration (FDA) approval of its new product CMZ-12, a cancer treatment drug. Management had been counting on sales of CMZ-12 this year to meet the provisions of the bond indenture. As the end of the fiscal year approaches, the company does not have sufficient current assets or income before taxes to meet the requirements. Roger Landon, the chief financial officer, proposes, "Since we can assume that FDA approval will occur early next year, I suggest we book sales and receivables from our major customers now in anticipation of next year's sales. This action will increase our current assets and our income before taxes. It is essential that we do this to save the company. Look at all the people who will be hurt if we don't do it." Is Landon's proposal acceptable accounting? Is it ethical? Who could be harmed by it? What steps might management take?



Cash Flow



CD-ROM



Communication



Critical Thinking



Ethics



General Ledger



Group Activity



Hot Links to Real Companies



International



Internet



Key Ratio



Memo



Spreadsheet

LO 3 Reading the Bond Markets**SD 4.**

Obtain a copy of a recent issue of *The Wall Street Journal* from your school or local library. Or, if you have access to an Internet service, visit *The Wall Street Journal's* home page. In the newspaper, find Section C, "Money & Investing," and turn to the page where the New York Exchange Bonds are listed. Notice, first, the Dow Jones Bond Averages of 20 bonds, ten utilities, and ten industrials. Are the averages above or below 100? Is this a premium or a discount? Is the market interest rate above or below the face rate of the average bond? Now, identify three bonds from those listed. Choose one that sells at a discount, one that sells at a premium, and one that sells for approximately 100. For each bond, write the name of the company, the face interest rate, the year the bond is due, the current yield, and the current closing market price. (Some bonds have the letters *cv* in the Yield column. This means the bonds are convertible into common stock and the yield may not be meaningful.) For each bond, explain the relationships between the face interest rate, the current yield, and the closing price. What other factors affect the current yield of a bond? Be prepared to discuss your findings in class.

**LO 1 Issuance of Long-Term
LO 2 Bonds Versus Leasing****SD 5.**

The *Weiss Chemical Corporation* plans to build or lease a new plant that will produce liquid fertilizer for the agricultural market. The plant is expected to cost \$800,000,000 and will be located in the southwestern United States. The company's chief financial officer, Sharon Weiss, has spent the last several weeks studying different means of financing the plant. From her talks with bankers and other financiers, she has decided that there are two basic choices: The plant can be financed through the issuance of a long-term bond or through a long-term lease. Details for the two options are as follows:

- Issue \$800,000,000 of 25-year, 16 percent bonds secured by the new plant. Interest on the bonds would be payable semiannually.
- Sign a 25-year lease for an existing plant calling for lease payments of \$65,400,000 on a semiannual basis.

Weiss wants to know what the effect of each choice will be on the company's financial statements. She estimates that the useful life of the plant is 25 years, at which time it is expected to have an estimated residual value of \$80,000,000.

Weiss plans a meeting to discuss the alternatives. Prepare a short memorandum to her identifying the issues that should be considered in making this decision. (Note: You are not asked to make any calculations, discuss the factors, or recommend an action.)

**LO 4 Valuing Bonds Using
Present Value****REQUIRED****LO 7 Characteristics of
Convertible Debt****FRA 1.**

International Paper Company has 9 percent bonds due in 2006 (in four years) and 9 percent bonds due in 2016 (in 14 years).¹²

Using present value tables and assuming a current market interest rate of 8 percent, calculate the market value of \$100,000,000 of each bond issue. Interest is paid semiannually. Will these bonds sell in the market at a premium or a discount? Explain. Also tell why there is a difference in the market value of the two issues.

FRA 2.

Amazon.com, Inc., gained renown as an online marketplace for books, records, and other products. Its stock price has risen greatly but the company has yet to earn a profit. To support its enormous growth, the company issued \$1,250,000,000 in 4¾ percent convertible notes due in 2009 at face value. Interest is payable on February 1 and



REQUIRED

August 1. The notes are convertible into common stock at a price of \$156 per share, which is 27 percent above the market price of \$123 for the common stock on the date of issue. The market value of Amazon.com's common stock has been quite volatile. Earlier it was \$200 per share.¹³

What reasons can you suggest for Amazon.com's management choosing notes that are convertible into common stock rather than simply issuing nonconvertible notes or issuing common stock directly? Are there any disadvantages to this approach? If the price of the company's common stock returns to \$200 per share, what would be the total theoretical value of the notes? If the holders of the notes were to elect to convert the notes into common stock, what would be the effect on the company's debt to equity ratio and what would be the effect on the percentage ownership of the company by other stockholders?

International Company

FRA 3.

LO 1 Comparison of Interest Coverage



Japanese companies have historically relied more on debt financing and are more highly leveraged than U.S. companies. For instance, *NEC Corporation* and *Sanyo Electric Co.*, two large Japanese electronics companies, had debt to equity ratios of about 3.6 and 2.5, respectively, in 1998. From the selected data from the companies' annual reports below (in millions of yen), compute the interest coverage ratios for the two companies for the two years and comment on the riskiness of the companies and on the trends presented.¹⁴

	NEC		Sanyo	
	1998	1997	1998	1997
Interest Expense	61,257	60,463	33,001	31,765
Income Before Income Taxes	90,993	121,222	38,267	41,486

Group Activity: Assign the two companies to different groups to calculate the ratios and discuss the results. Debrief by discussing the advantages and disadvantages of a debt-laden capital structure.

Toys "R" Us Annual Report

FRA 4.

LO 1 Business Practice, Long-Term Debt, and Leases



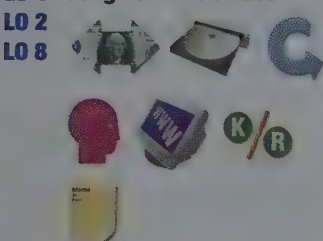
Refer to the Financial Statements and the Notes to Consolidated Financial Statements in the Toys "R" Us annual report and answer the following questions.

1. Is it the practice of Toys "R" Us to own or lease most of its property and equipment?
2. What proportion of total assets is financed with long-term debt? Calculate Toys "R" Us's interest coverage ratios for 1999 and 2000 and comment on the trend.
3. In what countries has Toys "R" Us incurred long-term debt? Which maturity date is farthest in the future?
4. Does Toys "R" Us lease property predominantly under capital leases or under operating leases? How much was rental expense for operating leases in 2000?

Fingraph® Financial Analyst™

FRA 5.

LO 1 Long-Term Liabilities



Select any two companies from the same industry on the Fingraph® Financial Analyst™ CD-ROM software.

1. In the annual reports for the companies you have selected, identify the long-term liabilities from the balance sheet and any reference to any long-term liabilities in the summary of significant accounting policies or notes to the financial statements. There is likely to be a separate note for each type of long-term liability. What are the most important current liabilities for each company? What are the most important long-term liabilities for each company?
2. Display and print in tabular and graphical form the Balance Sheet Analysis page. Prepare a table that compares the debt to equity and interest coverage ratios for both companies for two years.

3. Locate the statements of cash flows in the two companies' annual reports. Have the companies been increasing or decreasing their long-term debt? If increasing, what were each company's most important sources of long-term financing over the past two years? If decreasing, which liabilities are being decreased?
4. Find and read references to long-term liabilities in management's discussion and analysis in each annual report.
5. Write a one-page executive summary that highlights the most important types of long-term liabilities for these companies, identifies accounting policies for specific long-term liabilities, and compares the debt to equity and interest coverage trends of the two companies, including reference to management's assessment. Include the Fingraph® page and your table as an attachment to your report.

Internet Case

FRA 6.

Through the Needles Accounting Resource Center at <http://college.hmco.com>, go to the annual report at **United Airlines'** web site. Like most airlines United Airlines leases a portion of its aircraft used in daily operations. It also leases facilities at airport terminals. Within the most recent annual report disclosures, find the note disclosure on leases. Compare the dollar amount of operating leases (which are not on the balance sheet) with the total liabilities computed from the balance sheet. Does the amount of lease payments exceed the total liabilities? Compute the debt to equity ratio from the balance sheet. Discuss the impact these operating leases would have on the debt to equity ratio if these leases were reported on the balance sheet as an asset and a corresponding liability.

LO 1 Effect of Leases on
LO 8 Debt to Equity Ratio



ENDNOTES

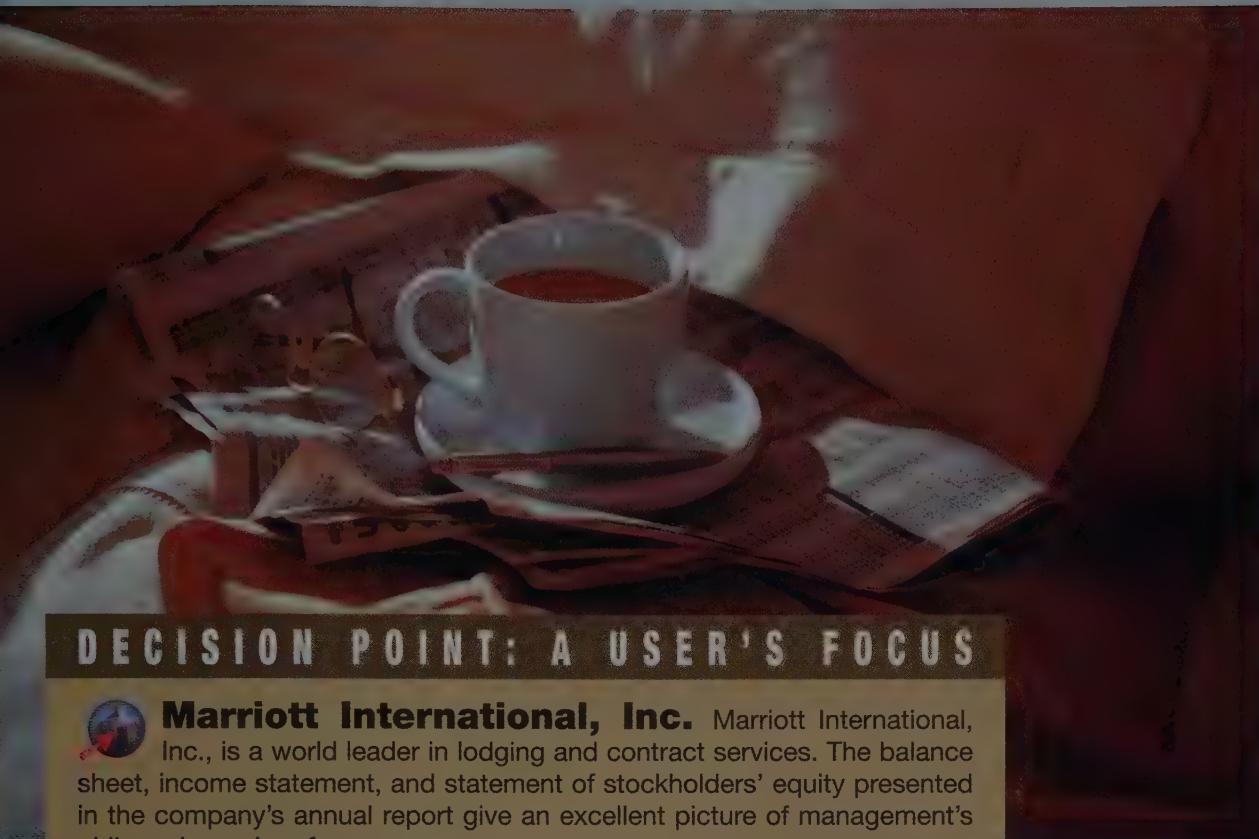
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3. Quentin Hardy, "Japanese Companies Need to Raise Cash, But First a Bond Market Must Be Built," *The Wall Street Journal*, October 20, 1992.
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8. Philip Morris Companies, Inc., *Annual Report*, 1999.
9. *Statement of Financial Accounting Standards No. 87*, "Employers' Accounting for Pensions" (Norwalk, Conn.: Financial Accounting Standards Board, 1985).
10. *Statement of Financial Accounting Standards No. 106*, "Employers' Accounting for Post-retirement Benefits Other Than Pensions" (Norwalk, Conn.: Financial Accounting Standards Board, 1990).
11. FedEx Corporation, *Annual Report*, 1999.
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The Statement of Cash Flows

LEARNING OBJECTIVES

- 1** Describe the statement of cash flows, and define *cash* and *cash equivalents*.
- 2** State the principal purposes and uses of the statement of cash flows.
- 3** Identify the principal components of the classifications of cash flows, and state the significance of noncash investing and financing transactions.
- 4** Analyze the statement of cash flows.
- 5** Use the indirect method to determine cash flows from operating activities.
- 6** Determine cash flows from investing activities and financing activities.
- 7** Use the indirect method to prepare a statement of cash flows.
- 8** Prepare a work sheet for the statement of cash flows.
- 9** Use the direct method to determine cash flows from operating activities and prepare a statement of cash flows.

SUPPLEMENTAL OBJECTIVES



DECISION POINT: A USER'S FOCUS



Marriott International, Inc. Marriott International, Inc., is a world leader in lodging and contract services. The balance sheet, income statement, and statement of stockholders' equity presented in the company's annual report give an excellent picture of management's philosophy and performance.

Those three financial statements are essential to the evaluation of a company, but they do not tell the entire story. Some information that they do not contain is presented in a fourth statement, the statement of cash flows, as shown in the Financial Highlights on the next page.¹ This statement shows how much cash was generated by the company's operations during the past three years and how much was used in or came from investing and financing activities. Marriott feels that maintaining adequate cash flows is important to the future of the company. In fact, Marriott's emphasis on cash flows is reflected in its executive compensation plan for its chief executive officer and senior executive officers. A review of the plan indicates that a measure of cash flows, at the firm or business group level, is the financial measure given the highest weight in determining compensation. Why would Marriott emphasize cash flows to such an extent?

Strong cash flows are essential to management's key goal of liquidity. If cash flows exceed the amount needed for operations and expansion, the company will not have to borrow additional funds. The excess cash flows will be available to reduce the company's debt and improve its financial position by lowering its debt to equity ratio. Another reason for the emphasis on cash flows may be the belief that strong cash flows from operations create shareholder value or increase the market value of the company's stock.

The statement of cash flows demonstrates management's commitments for the company in ways that are not readily apparent in the other financial statements. For example, the statement of cash flows can show whether management's focus is on the short term or the long term. This statement is required by the FASB² and satisfies the FASB's long-held position that a primary objective of financial statements is to provide investors and creditors with information about a company's cash flows.³

Financial Highlights: Consolidated Statement of Cash Flows

Marriott International, Inc., and Subsidiaries

	1999	1998	1997
	(In millions)		
Operating Activities			
Net income	\$400	\$ 390	\$ 324
Adjustments to reconcile to cash provided by operations:			
Depreciation and amortization	162	140	126
Income taxes	87	76	64
Timeshare activity, net	(102)	28	(118)
Other	19	(22)	88
Working capital changes:			
Accounts receivable	(126)	(104)	(190)
Inventories	(17)	15	(3)
Other current assets	(38)	(16)	(15)
Accounts payable and accruals	326	98	266
Cash provided by operations	711	605	542
Investing Activities			
Capital expenditures	(929)	(937)	(520)
Acquisitions	(61)	(48)	(859)
Dispositions of property and equipment	436	332	571
Loan advances	(144)	(48)	(95)
Loan collections and sales	54	169	47
Other	(143)	(192)	(190)
Cash used in investing activities	(787)	(724)	(1,046)
Financing Activities			
Issuance of long-term debt	831	1,294	16
Repayment of long-term debt	(173)	(473)	(15)
Redemption of convertible subordinated debt	(120)	—	—
Issuance of common stock	43	15	—
Dividends paid	(52)	(37)	—
Purchase of treasury stock	(354)	(398)	—
Advances (to) from Old Marriott	—	(100)	576
Cash provided by (used in) financing activities	175	301	577
Increase/(Decrease) in Cash and Equivalents	99	182	73
Cash and Equivalents, beginning of year	390	208	135
Cash and Equivalents, end of year	\$489	\$ 390	\$ 208



Overview of the Statement of Cash Flows

OBJECTIVE

1 Describe the statement of cash flows, and define *cash* and *cash equivalents*

The **statement of cash flows** shows how a company's operating, investing, and financing activities have affected cash during an accounting period. It explains the net increase (or decrease) in cash during the accounting period. For purposes of preparing this statement, **cash** is defined to include both cash and cash equivalents. **Cash equivalents** are defined by the FASB as short-term, highly liquid investments, including money market accounts, commercial paper, and U.S. Treasury bills. A company maintains cash equivalents to earn interest on cash that would otherwise remain unused temporarily. Suppose, for example, that a company has \$1,000,000 that it will not need for 30 days. To earn a return on this amount, the company may place the cash in an account that earns interest (such as a money market account), it may loan the cash to another corporation by purchasing that corporation's short-term notes (commercial paper), or it may purchase a short-term obligation of the U.S. government (Treasury bills). In this context, short-term refers to original maturities of 90 days or less. Since cash and cash

VIDEO CASE



Goodyear Tire & Rubber Company

Objectives

- To state the purposes of the statement of cash flows.
- To identify the three components of the statement of cash flows.
- To identify the reasons why cash flows from operating activities usually differs from net income.
- To understand the importance of cash flows from investing and financing activities.

Background for the Case

Goodyear was founded in 1898 by Frank Seiberling, who borrowed \$3,500 to start a bicycle tire factory and subsequently began making tires for horseless carriages. Today Goodyear is the world's largest tire and rubber company, with factories in 28 countries and more than 100,000 employees. In a recent year, sales exceeded \$14 billion.



In addition to Goodyear brand tires, the company makes Dunlop, Kelly, Fulda, Lee, Sava, and Debica tires and rubber products for the automotive and industrial markets.


Goodyear's vision is to be ranked by all measures as the best tire and rubber company in the world. It intends to accomplish this vision by achieving

- fast and profitable growth in all core businesses.

- a number 1 or 2 market position.
- strategic acquisitions and expansions.
- lowest cost producer.

To achieve these objectives, especially "fast and profitable growth" and "strategic acquisitions and expansions," Goodyear will need adequate funding. Management expects the funding to come from strong cash flows, divestiture of underperforming, nonstrategic assets, and debt issues. Within this framework, management must maintain the company's financial health and a strong balance sheet, with a debt to debt plus equity ratio of 25 to 30 percent.

Goodyear's performance in meeting the challenge of achieving adequate funding requires an ability to read and understand the statement of cash flows.

 For more information about Goodyear Tire & Rubber Company, visit the company's web site through the Needles Accounting Resource Center at:

<http://college.hmco.com>

Required

1. What are the purposes and three main components of the statement of cash flows?
2. What is the most important amount in the statement of cash flows and why?
3. What is the relationship of cash flows from operating activities to net income for Goodyear, and how do you account for the difference?
4. What are the principal investing and financing activities for Goodyear?

equivalents are considered the same, transfers between the Cash account and cash equivalents are not treated as cash receipts or cash payments. In effect, cash equivalents are combined with the Cash account on the statement of cash flows.

Cash equivalents should not be confused with short-term investments or marketable securities, which are not combined with the Cash account on the statement of cash flows. Purchases of marketable securities are treated as cash outflows and sales of marketable securities as cash inflows on the statement of cash flows. In this chapter, cash will be assumed to include cash and cash equivalents.

Purposes of the Statement of Cash Flows

OBJECTIVE

2 State the principal purposes and uses of the statement of cash flows

The primary purpose of the statement of cash flows is to provide information about a company's cash receipts and cash payments during an accounting period. A secondary purpose of the statement is to provide information about a company's operating, investing, and financing activities during the accounting period. Some information about those activities may be inferred by examining other financial statements, but it is on the statement of cash flows that all the transactions affecting cash are summarized.

Internal and External Uses of the Statement of Cash Flows

The statement of cash flows is useful internally to management and externally to investors and creditors. Management uses the statement to assess liquidity, to determine dividend policy, and to evaluate the effects of major policy decisions involving investments and financing. In other words, management may use the statement to determine if short-term financing is needed to pay current liabilities, to decide whether to raise or lower dividends, and to plan for investing and financing needs.

Investors and creditors will find the statement useful in assessing the company's ability to manage cash flows, to generate positive future cash flows, to pay its liabilities, to pay dividends and interest, and to anticipate its need for additional financing. Also, they may use the statement to explain the differences between net income on the income statement and the net cash flows generated from operations. In addition, the statement shows both the cash and the noncash effects of investing and financing activities during the accounting period.

Classification of Cash Flows

OBJECTIVE

3 Identify the principal components of the classifications of cash flows, and state the significance of noncash investing and financing transactions

The statement of cash flows classifies cash receipts and cash payments into the categories of operating, investing, and financing activities. The components of these activities are illustrated in Figure 1 and summarized below.

1. **Operating activities** include the cash effects of transactions and other events that enter into the determination of net income. Included in this category as cash inflows are cash receipts from customers for goods and services, interest and dividends received on loans and investments, and sales of trading securities. Included as cash outflows are cash payments for wages, goods and services, expenses, interest, taxes, and purchases of trading securities. In effect, the income statement is changed from an accrual to a cash basis.
2. **Investing activities** include the acquiring and selling of long-term assets, the acquiring and selling of marketable securities other than trading securities or cash equivalents, and the making and collecting of loans. Cash inflows include the cash received from selling long-term assets and marketable securities and from collecting loans. Cash outflows include the cash expended for purchases of long-term assets and marketable securities and the cash loaned to borrowers.



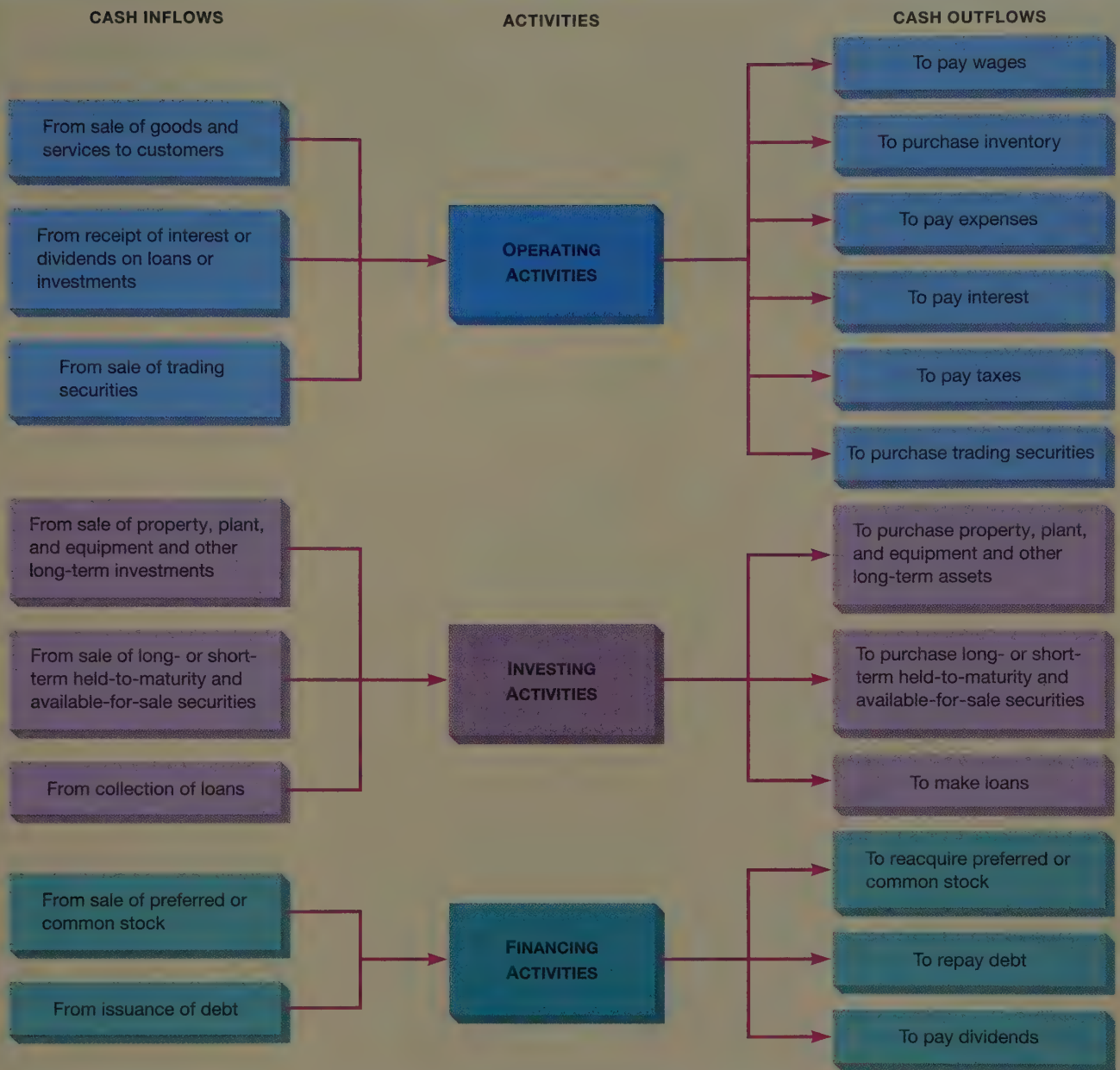


Figure 1
Classification of Cash Inflows
and Cash Outflows

3. **Financing activities** include obtaining resources from or returning resources to owners and providing them with a return on their investment, and obtaining resources from creditors and repaying the amounts borrowed or otherwise settling the obligations. Cash inflows include the proceeds from issues of stocks and from short-term and long-term borrowing. Cash outflows include the repayments of loans (excluding interest) and payments to owners, including cash dividends. Treasury stock transactions are also considered financing activities. Repayments of accounts payable or accrued liabilities are not considered repayments of loans under financing activities, but are classified as cash outflows under operating activities.

A company will occasionally engage in significant **noncash investing and financing transactions** involving only long-term assets, long-term liabilities, or

FOCUS ON INTERNATIONAL BUSINESS

Despite the importance of the statement of cash flows in assessing the liquidity of companies in the United States, considerable variation in its use and format has existed in other countries. For example, the principal

directives related to financial reporting for the European Union do not address the statement of cash flows. In many countries, the statement shows the change in working capital instead of the change in cash and cash equivalents. However, international accounting standards require the statement of cash flows, and international financial markets expect it to be presented. As a result, most multinational companies include the statement in their financial reports.

stockholders' equity, such as the exchange of a long-term asset for a long-term liability or the settlement of a debt by issuing capital stock. For instance, a company might take out a long-term mortgage for the purchase of land and a building, or it might convert long-term bonds into common stock. Such transactions represent significant investing and financing activities, but they would not be reflected on the statement of cash flows because they do not involve either cash inflows or cash outflows. However, one purpose of the statement of cash flows is to show investing and financing activities, and because such transactions will affect future cash flows, the FASB has determined that they should be disclosed in a separate schedule as part of the statement of cash flows. In this way, the reader of the statement will see the company's investing and financing activities more clearly.

Format of the Statement of Cash Flows



The statement of cash flows, as shown in the Financial Highlights for Marriott International at the beginning of this chapter, is divided into three sections. The first section, cash flows from operating activities, is presented using the indirect method. This is the most common method and is explained in learning objective 5 of this chapter. The other two sections of the statement of cash flows are the cash flows from investing activities and the cash flows from financing activities. The individual cash inflows and outflows from investing and financing activities are shown separately in their respective categories. Normally, cash outflows for the purchase of plant assets are shown separately from cash inflows from the disposal of plant assets. However, some companies follow the practice of combining these two lines in order to show the net amount of outflow, because the inflows are not usually material.

A reconciliation of the beginning and ending balances of cash is shown near the bottom of the statement. It shows that Marriott International had a net increase in cash of \$99 million in 1999, which together with the beginning balance of \$390 million results in \$489 million of cash and cash equivalents on hand at the end of the year.

Analyzing the Statement of Cash Flows

OBJECTIVE

4 Analyze the statement of cash flows

Like the other financial statements, the statement of cash flows can be analyzed to reveal significant relationships. Two areas analysts examine when studying a company are cash-generating efficiency and free cash flow.

Cash-Generating Efficiency



Cash-generating efficiency is the ability of a company to generate cash from its current or continuing operations. Three ratios are helpful in measuring cash-generating efficiency: cash flow yield, cash flows to sales, and cash flows to assets. These ratios are computed and discussed below for Marriott International for 1999.⁴ Data for the computations are obtained from the Financial Highlights for Marriott International at the beginning of this chapter and below; all dollar amounts used to compute the ratios are stated in millions.

Cash flow yield is the ratio of net cash flows from operating activities to net income, as follows:



$$\begin{aligned}\text{Cash Flow Yield} &= \frac{\text{Net Cash Flows from Operating Activities}}{\text{Net Income}} \\ &= \frac{\$711}{\$400} \\ &= 1.8 \text{ times}\end{aligned}$$

Marriott International provides a good cash flow yield of 1.8 times; that is, operating activities are generating about 80 percent more cash flow than net income. If special items, such as discontinued operations, appear on the income statement and are material, income from continuing operations should be used as the denominator.

Financial Highlights for Marriott International

(In millions of dollars)

	1999	1998	1997
Net Sales	\$8,739	\$7,968	\$7,236
Total Assets	7,324	6,233	5,161

Cash flows to sales is the ratio of net cash flows from operating activities to sales.



$$\begin{aligned}\text{Cash Flows to Sales} &= \frac{\text{Net Cash Flows from Operating Activities}}{\text{Net Sales}} \\ &= \frac{\$711}{\$8,739} \\ &= 8.1\%\end{aligned}$$

Marriott generates cash flows to sales of 8.1 percent. The company generated a positive but relatively small percentage of net cash from sales.

Cash flows to assets is the ratio of net cash flows from operating activities to average total assets, as follows:



$$\begin{aligned}\text{Cash Flows to Assets} &= \frac{\text{Net Cash Flows from Operating Activities}}{\text{Average Total Assets}} \\ &= \frac{\$711}{(\$7,324 + \$6,233) \div 2} \\ &= 10.5\%\end{aligned}$$

The cash flows to assets is higher than cash flows to sales because Marriott has a good asset turnover ratio (sales \div average total assets) of approximately 1.3 times (10.5% \div 8.1%). Cash flows to sales and cash flows to assets are closely related to

the profitability measures profit margin and return on assets. They exceed those measures by the amount of the cash flow yield ratio because cash flow yield is the ratio of net cash flows from operating activities to net income.

Although Marriott's cash flow yield and cash flows to assets are relatively good, its efficiency at generating cash flows from operating activities, as measured by cash flows to sales, could be improved.

Free Cash Flow



It would seem logical for the analysis to move along to investing and financing activities. For example, in 1999 Marriott has a net cash outflow of \$787 million in the investing activities section, which could indicate that the company is expanding. However, that figure mixes capital expenditures for plant assets, which reflect management's expansion of operations, with the acquisition of hotel chains and loans and repayments. Also, cash flows from financing activities provided \$175 million, but that figure combines financing activities associated with long-term debt and stocks with dividends paid to stockholders. While something can be learned by looking at those broad categories, many analysts find it more informative to go beyond them and focus on a computation called free cash flow.

Free cash flow is the amount of cash that remains after deducting the funds the company must commit to continue operating at its planned level. The commitments must cover current or continuing operations, interest, income taxes, dividends, and net capital expenditures. Cash requirements for current or continuing operations, interest, and income taxes must be paid or the company's creditors and the government can take legal action. Although the payment of dividends is not strictly required, dividends normally represent a commitment to stockholders. If these payments are reduced or eliminated, stockholders will be unhappy and the price of the company's stock will fall. Net capital expenditures represent management's plans for the future.

If free cash flow is positive, it means that the company has met all of its planned cash commitments and has cash available to reduce debt or expand. A negative free cash flow means that the company will have to sell investments, borrow money, or issue stock in the short term to continue at its planned levels. If free cash flow remains negative for several years, a company may not be able to raise cash by issuing stock or bonds.

Since cash commitments for current or continuing operations, interest, and income taxes are incorporated in cash flows from current operations, free cash flow for Marriott is computed as follows (in millions):



$$\begin{aligned}
 \text{Free Cash Flow} &= \text{Net Cash Flows from Operating Activities} - \text{Dividends} \\
 &\quad - \text{Purchases of Plant Assets} + \text{Sales of Plant Assets} \\
 &= \$711 - \$52 - \$929 + \$436 \\
 &= \$166
 \end{aligned}$$

Purchases and sales of plant assets appear in the investing activities section of the statement of cash flows. Marriott reports both capital expenditures and dispositions of property and equipment. Dividends are found in the financing activities section. Marriott has positive free cash flow of \$166 million due primarily to its strong operating cash flow of \$711 million and \$436 million cash received on disposal of property and equipment. The cash provided by financing activities was the lowest in three years, only \$175 million, and possible because of increasing cash provided by operations. The company repaid long-term debt of \$293 million (\$173 + \$120) while issuing new debt of \$831 million. Marriott also issued common stock in the amount of \$43 million and purchased treasury stock for \$354 million. The result is that financing activities were a positive \$175 million.

FOCUS ON BUSINESS PRACTICE

Because the statement of cash flows has been around for only a decade, no generally accepted analyses have yet been developed. For example, the term *free cash flow* is commonly used in the business press, but there is no agreement on its definition. An article in *Forbes* defines *free cash flow* as “cash available after paying

out capital expenditures and dividends, *but before taxes and interest*”⁵ [emphasis added]. In *The Wall Street Journal*, free cash flow was defined as “operating income less maintenance-level capital expenditures.”⁶ The definition with which we are most in agreement is the one used in *Business Week*, which is net cash flows from operating activities less net capital expenditures and dividends. This “measures truly discretionary funds—company money that an owner could pocket without harming the business.”⁷

Cash flows can vary from year to year, so it is best to look at trends in cash flow measures over several years when analyzing a company’s cash flows. Marriott’s cash flow yield has shown little variation over the past three years. Management sums up in the annual report:

Cash from Operations

The company’s operating cash flow is stable, and typically does not fluctuate widely within an economic cycle.⁸

The Indirect Method of Preparing the Statement of Cash Flows

OBJECTIVE

5 Use the indirect method to determine cash flows from operating activities

To demonstrate the preparation of the statement of cash flows, we will work through an example step by step. The data for this example are presented in Exhibits 1 and 2. Those two exhibits present Ryan Corporation’s balance sheets for December 31, 20x1 and 20x0, and its 20x1 income statement. Since the changes in the balance sheet accounts will be used for analysis, those changes are shown in Exhibit 1. Whether the change in each account is an increase or a decrease is also shown. In addition, Exhibit 2 contains data about transactions that affected non-current accounts. Those transactions would be identified by the company’s accountants from the records.

There are four steps in preparing the statement of cash flows:

1. Determine cash flows from operating activities.
2. Determine cash flows from investing activities.
3. Determine cash flows from financing activities.
4. Use the information obtained in the first three steps to compile the statement of cash flows.

Determining Cash Flows from Operating Activities



The first step in preparing the statement of cash flows is to determine cash flows from operating activities. The income statement indicates a business’s success or failure in earning an income from its operating activities, but it does not reflect the inflow and outflow of cash from those activities. The reason is that the income statement is prepared on an accrual basis. Revenues are recorded even though the

Ryan Corporation
Comparative Balance Sheets
December 31, 20x1 and 20x0

	20x1	20x0	Change	Increase or Decrease
Assets				
Current Assets				
Cash	\$ 46,000	\$ 15,000	\$ 31,000	Increase
Accounts Receivable (net)	47,000	55,000	(8,000)	Decrease
Inventory	144,000	110,000	34,000	Increase
Prepaid Expenses	1,000	5,000	(4,000)	Decrease
Total Current Assets	<u>\$238,000</u>	<u>\$185,000</u>	<u>\$ 53,000</u>	
Investments Available for Sale	<u>\$115,000</u>	<u>\$127,000</u>	<u>(\$ 12,000)</u>	Decrease
Plant Assets				
Plant Assets	\$715,000	\$505,000	\$210,000	Increase
Accumulated Depreciation	<u>(103,000)</u>	<u>(68,000)</u>	<u>(35,000)</u>	Increase
Total Plant Assets	<u>\$612,000</u>	<u>\$437,000</u>	<u>\$175,000</u>	
Total Assets	<u><u>\$965,000</u></u>	<u><u>\$749,000</u></u>	<u><u>\$216,000</u></u>	
Liabilities				
Current Liabilities				
Accounts Payable	\$ 50,000	\$ 43,000	\$ 7,000	Increase
Accrued Liabilities	12,000	9,000	3,000	Increase
Income Taxes Payable	3,000	5,000	(2,000)	Decrease
Total Current Liabilities	<u>\$ 65,000</u>	<u>\$ 57,000</u>	<u>\$ 8,000</u>	
Long-Term Liabilities				
Bonds Payable	<u>295,000</u>	<u>245,000</u>	<u>50,000</u>	Increase
Total Liabilities	<u><u>\$360,000</u></u>	<u><u>\$302,000</u></u>	<u><u>\$ 58,000</u></u>	
Stockholders' Equity				
Common Stock, \$5 par value	\$276,000	\$200,000	\$ 76,000	Increase
Paid-in Capital in Excess of Par Value, Common	189,000	115,000	74,000	Increase
Retained Earnings	<u>140,000</u>	<u>132,000</u>	<u>8,000</u>	Increase
Total Stockholders' Equity	<u><u>\$605,000</u></u>	<u><u>\$447,000</u></u>	<u><u>\$158,000</u></u>	
Total Liabilities and Stockholders' Equity	<u><u>\$965,000</u></u>	<u><u>\$749,000</u></u>	<u><u>\$216,000</u></u>	

Exhibit 1
Comparative Balance Sheets
with Changes in Accounts
Indicated for Ryan Corporation

cash for them may not have been received, and expenses are recorded even though the cash for them may not have been expended. As a result, to arrive at cash flows from operations, the figures on the income statement must be converted from an accrual basis to a cash basis.

There are two methods of converting the income statement from an accrual basis to a cash basis: the direct method and the indirect method. Under the **direct method**, each item on the income statement is adjusted from the accrual basis to the cash basis. The result is a statement that begins with cash receipts from sales

Exhibit 2
Income Statement and Other
Information on Noncurrent
Accounts for Ryan Corporation

Ryan Corporation
Income Statement
For the Year Ended December 31, 20x1

Net Sales		\$698,000
Cost of Goods Sold		<u>520,000</u>
Gross Margin		\$178,000
Operating Expenses (including Depreciation Expense of \$37,000)		<u>147,000</u>
Operating Income		\$ 31,000
Other Income (Expenses)		
Interest Expense	(\$23,000)	
Interest Income	6,000	
Gain on Sale of Investments	12,000	
Loss on Sale of Plant Assets	<u>(3,000)</u>	<u>(8,000)</u>
Income Before Income Taxes		\$ 23,000
Income Taxes		<u>7,000</u>
Net Income		<u>\$ 16,000</u>

Other transactions affecting noncurrent accounts during 20x1:

1. Purchased investments in the amount of \$78,000.
2. Sold investments for \$102,000 that cost \$90,000.
3. Purchased plant assets in the amount of \$120,000.
4. Sold plant assets that cost \$10,000 with accumulated depreciation of \$2,000 for \$5,000.
5. Issued \$100,000 of bonds at face value in a noncash exchange for plant assets.
6. Repaid \$50,000 of bonds at face value at maturity.
7. Issued 15,200 shares of \$5 par value common stock for \$150,000.
8. Paid cash dividends in the amount of \$8,000.

and interest and deducts cash payments for purchases, operating expenses, interest payments, and income taxes to arrive at net cash flows from operating activities. The **indirect method**, on the other hand, does not require the individual adjustment of each item on the income statement, but lists only those adjustments necessary to convert net income to cash flows from operations. Because the indirect method is more common, it will be used to illustrate the conversion of the income statement to a cash basis in the sections that follow. The direct method is presented in a supplemental objective at the end of the chapter.

FOCUS ON BUSINESS PRACTICE

The direct method and the indirect method of determining cash flows from operating activities produce the same results. If the direct method is used, a reconciliation of net income to net cash flows from operating activities must be provided in a separate schedule. The

FASB recommends, but does not require, the direct method, but a survey of large companies showed that an overwhelming majority, 98 percent, chose to use the indirect method.⁹ The reasons for choosing the indirect method vary, but chief financial officers tend to prefer it because it is easier and less expensive to implement. Also, with the required reconciliation under the direct method, the same information is provided as under the indirect method.

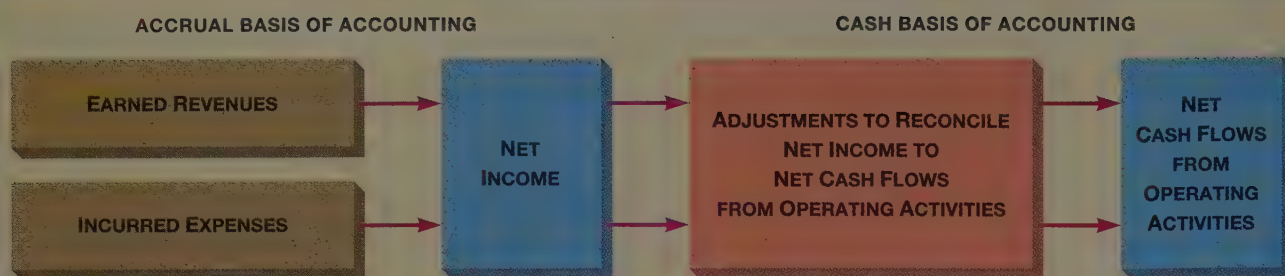


Figure 2
Indirect Method of
Determining Net Cash Flows
from Operating Activities

The indirect method, as illustrated in Figure 2, focuses on items from the income statement that must be adjusted to reconcile net income to net cash flows from operating activities. The items that require attention are those that affect net income but not net cash flows from operating activities, such as depreciation and amortization, gains and losses, and changes in the balances of current asset and current liability accounts. The reconciliation of Ryan Corporation's net income to net cash flows from operating activities is shown in Exhibit 3. Each adjustment is discussed in the following sections.

DEPRECIATION Cash payments for plant assets, intangibles, and natural resources occur when the assets are purchased and are reflected as investing activities on the statement of cash flows at that time. When depreciation expense, amortization expense, and depletion expense appear on the income statement, they simply indicate allocations of the costs of the original purchases to the current accounting period; they do not affect net cash flows in the current period. The amount of such expenses can usually be found by referring to the income statement or a note to the financial statements. For Ryan Corporation, the income statement reveals depreciation expense of \$37,000, which would have been recorded as follows:

A = L + OE	Depreciation Expense	37,000	
— —	Accumulated Depreciation		37,000
	To record annual depreciation on plant assets		

The recording of depreciation involved no outlay of cash even though depreciation expense appears on the income statement. Thus, to derive cash flows from operations, an adjustment for depreciation is needed to increase net income by the amount of depreciation recorded.

GAINS AND LOSSES Gains and losses that appear on the income statement also do not affect cash flows from operating activities and need to be removed from this section of the statement of cash flows. The cash receipts generated from the disposal of the assets that resulted in the gains or losses are shown in the investing section of the statement of cash flows. Thus, gains and losses are removed from net income (preventing double counting) to reconcile net income to cash flows from operating activities. For example, on the income statement, Ryan Corporation showed a \$12,000 gain on the sale of investments, and this is subtracted from net income to reconcile net income to net cash flows from operating activities. The reason for this is that the \$12,000 is already included (added) in the investing activities section as part of the \$102,000 cash from the sale of the investment. Because the gain is included in the calculation of net income, the \$12,000 gain needs to be subtracted to prevent double counting. Also, Ryan Corporation showed a \$3,000 loss on the sale of plant assets. Following the same logic, the \$3,000 loss is already reflected in the \$5,000 sale of plant assets in the investing activities section. Thus, the \$3,000 is added to net income to reconcile net income to net cash flows from operating activities.

Exhibit 3
Schedule of Cash Flows from
Operating Activities: Indirect
Method

Ryan Corporation		
Schedule of Cash Flows from Operating Activities		
For the Year Ended December 31, 20x1		
Cash Flows from Operating Activities		
Net Income		\$16,000
Adjustments to Reconcile Net Income to Net		
Cash Flows from Operating Activities		
Depreciation	\$37,000	
Gain on Sale of Investments	(12,000)	
Loss on Sale of Plant Assets	3,000	
Changes in Current Assets and Current Liabilities		
Decrease in Accounts Receivable	8,000	
Increase in Inventory	(34,000)	
Decrease in Prepaid Expenses	4,000	
Increase in Accounts Payable	7,000	
Increase in Accrued Liabilities	3,000	
Decrease in Income Taxes Payable	(2,000)	14,000
Net Cash Flows from Operating Activities		\$30,000

CHANGES IN CURRENT ASSETS Decreases in current assets other than cash have positive effects on cash flows, and increases in current assets have negative effects on cash flows. For example, refer to the balance sheets and income statement for Ryan Corporation in Exhibits 1 and 2. Note that net sales in 20x1 were \$698,000 and that Accounts Receivable decreased by \$8,000. Thus, cash received from sales was \$706,000, calculated as follows:

$$\$706,000 = \$698,000 + \$8,000$$

Collections were \$8,000 more than sales recorded for the year. This relationship may be illustrated as follows:

Accounts Receivable		
Sales to Customers	Beg. Bal.	55,000
		706,000
		→ Cash Receipts from Customers
	→	698,000
	End. Bal.	47,000

Thus, to reconcile net income to net cash flows from operating activities, the \$8,000 decrease in Accounts Receivable is added to net income.

Inventory may be analyzed in the same way. For example, Exhibit 1 shows that Inventory increased by \$34,000 from 20x0 to 20x1. This means that Ryan Corporation expended \$34,000 more in cash for purchases than was included in cost of goods sold on the income statement. As a result of this expenditure, net income is higher than the net cash flows from operating activities, so \$34,000 must be deducted from net income.

Using similar logic, the decrease of \$4,000 in Prepaid Expenses is added to net income to reconcile net income to net cash flows from operations.

CHANGES IN CURRENT LIABILITIES Changes in current liabilities have the opposite effects on cash flows from those of changes in current assets. Increases in current liabilities are added to net income, and decreases in current liabilities are deducted from net income to reconcile net income to net cash flows from operating activities. For example, note from Exhibit 1 that Ryan Corporation had a

\$7,000 increase in Accounts Payable from 20x0 to 20x1. This means that Ryan Corporation paid \$7,000 less to creditors than what appears as purchases on the income statement. This relationship may be visualized as follows:

Accounts Payable			
Cash Payments to Suppliers	← 547,000	Beg. Bal.	43,000
			554,000* ← Purchases
		End. Bal.	50,000

*Purchases = Cost of Goods Sold (\$520,000) + Increase in Inventory (\$34,000).

As a result, \$7,000 is added to net income to reconcile net income to net cash flows from operating activities.

Using similar logic, the increase of \$3,000 in Accrued Liabilities is added to net income, but the decrease of \$2,000 in Income Taxes Payable is deducted from net income to reconcile net income to net cash flows from operating activities.

SCHEDULE OF CASH FLOWS FROM OPERATING ACTIVITIES In summary, Exhibit 3 shows that by using the indirect method, net income of \$16,000 has been adjusted by reconciling items totaling \$14,000 to arrive at net cash flows from operating activities of \$30,000. This means that although net income was \$16,000, Ryan Corporation actually had net cash flows available from operating activities of \$30,000 to use for purchasing assets, reducing debts, or paying dividends.

SUMMARY OF ADJUSTMENTS The effects of items on the income statement that do not affect cash flows may be summarized as follows:

	Add to or Deduct from Net Income
Depreciation Expense	Add
Amortization Expense	Add
Depletion Expense	Add
Losses	Add
Gains	Deduct

The adjustments for increases and decreases in current assets and current liabilities may be summarized as follows.

	Add to Net Income	Deduct from Net Income
Current Assets		
Accounts Receivable (net)	Decrease	Increase
Inventory	Decrease	Increase
Prepaid Expenses	Decrease	Increase
Current Liabilities		
Accounts Payable	Increase	Decrease
Accrued Liabilities	Increase	Decrease
Income Taxes Payable	Increase	Decrease

Determining Cash Flows from Investing Activities

OBJECTIVE

6 Determine cash flows from investing activities and financing activities



The second step in preparing the statement of cash flows is to determine cash flows from investing activities. Each account involving cash receipts and cash payments from investing activities is examined individually. The objective is to explain the change in each account balance from one year to the next.

Investing activities center on the long-term assets shown on the balance sheet, but they also include transactions affecting short-term investments from the current

assets section of the balance sheet and investment gains and losses from the income statement. The balance sheets in Exhibit 1 show that Ryan Corporation has long-term assets of investments and plant assets, but no short-term investments. The income statement in Exhibit 2 shows that Ryan has investment-related items in the form of a gain on the sale of investments and a loss on the sale of plant assets.

The schedule at the bottom of Exhibit 2 lists the following five items pertaining to investing activities in 20x1:

1. Purchased investments in the amount of \$78,000.
2. Sold investments for \$102,000 that cost \$90,000.
3. Purchased plant assets in the amount of \$120,000.
4. Sold plant assets that cost \$10,000 with accumulated depreciation of \$2,000 for \$5,000.
5. Issued \$100,000 of bonds at face value in a noncash exchange for plant assets.

The following paragraphs analyze the accounts related to investing activities to determine their effects on Ryan Corporation's cash flows.

INVESTMENTS The objective here is to explain the corporation's \$12,000 decrease in investments, all of which are classified as available-for-sale securities. This is accomplished by analyzing the increases and decreases in the Investments account to determine the effects on the Cash account. Purchases increase investments, and sales decrease investments. Item 1 in Ryan's list of investing activities shows purchases of \$78,000 during 20x1.

This transaction is recorded as follows:

A = L + OE	Investments	78,000	
+	Cash		78,000
—	Purchase of investments		

The entry shows that the effect of this transaction is a \$78,000 decrease in cash flows.

Item 2 in the list shows a sale of investments for \$102,000 that cost \$90,000, which results in a gain of \$12,000. This transaction was recorded as follows:

A = L + OE	Cash	102,000	
+	Investments		90,000
—	Gain on Sale of Investments		12,000
	Sale of investments for a gain		

The effect of this transaction is a \$102,000 increase in cash flows. Note that the gain on sale of investments is included in the \$102,000. This is the reason it was excluded earlier (see page 722) in computing cash flows from operations. If it had been included in that section, it would have been counted twice.

The \$12,000 decrease in the Investments account (unrelated to the \$12,000 gain above) during 20x1 has now been explained, as seen in the following T account:

Investments			
Beg. Bal.	127,000	Sales	90,000
Purchases	78,000		
End. Bal.	115,000		

The cash flow effects from these transactions are shown in the Cash Flows from Investing Activities section on the statement of cash flows as follows:

Purchase of Investments	(\$ 78,000)
Sale of Investments	102,000

Notice that purchases and sales are listed separately as cash outflows and cash inflows to give readers of the statement a complete view of investing activity. Some companies prefer to combine them into a single net amount.

If Ryan Corporation had short-term investments or marketable securities, the analysis of cash flows would be the same.

PLANT ASSETS In the case of plant assets, it is necessary to explain the changes in both the asset account and the related accumulated depreciation account. According to Exhibit 1, Plant Assets increased by \$210,000 and Accumulated Depreciation increased by \$35,000. Purchases increase plant assets, and sales decrease plant assets. Accumulated depreciation is increased by the amount of depreciation expense and decreased by the removal of the accumulated depreciation associated with plant assets that are sold. Three items listed in Exhibit 2 affect plant assets. Item 3 in the list on the previous page indicates that Ryan Corporation purchased plant assets totaling \$120,000 during 20x1, as shown by the following entry:

A = L + OE	Plant Assets	120,000	
+	Cash		120,000
-	Purchase of plant assets		

This transaction results in a cash outflow of \$120,000.

Item 4 states that Ryan Corporation took plant assets that had cost \$10,000 and had accumulated depreciation of \$2,000, and sold them for \$5,000, which resulted in a loss of \$3,000. The entry to record this transaction is as follows:

A = L + OE	Cash	5,000	
+	-		
+	Accumulated Depreciation	2,000	
+	Loss on Sale of Plant Assets	3,000	
-	Plant Assets		10,000
	Sale of plant assets at a loss		

Note that in this transaction the positive cash flow is equal to the amount of cash received, or \$5,000. The loss on the sale of plant assets is included here and excluded from the operating activities section (see page 722) by adjusting net income for the amount of the loss. The amount of a loss or gain on the sale of an asset is determined by the amount of cash received and does not represent a cash outflow or inflow.

The disclosure of these two transactions in the investing activities section of the statement of cash flows is as follows:

Purchase of Plant Assets	(\$120,000)
Sale of Plant Assets	5,000

As with investments, cash outflows and cash inflows are not combined here, but are sometimes combined into a single net amount.

Item 5 on the list of Ryan’s investing activities is a noncash exchange that affects two long-term accounts, Plant Assets and Bonds Payable. It was recorded as follows:

A = L + OE	Plant Assets	100,000	
+	+	Bonds Payable	100,000
	Issued bonds at face value for plant assets		

Although this transaction does not involve an inflow or outflow of cash, it is a significant transaction involving both an investing activity (the purchase of plant assets) and a financing activity (the issue of bonds payable). Because one purpose of the statement of cash flows is to show important investing and financing activities,

the transaction is listed in a separate schedule, either at the bottom of the statement of cash flows or accompanying the statement, as follows:

Schedule of Noncash Investing and Financing Transactions

Issue of Bonds Payable for Plant Assets \$100,000

Through our analysis of the preceding transactions and the depreciation expense for plant assets of \$37,000, all the changes in the plant assets accounts have now been accounted for, as shown in the following T accounts:

Plant Assets			
Beg. Bal.	505,000	Sale	10,000
Cash Purchase	120,000		
Noncash Purchase	100,000		
End. Bal.	715,000		

Accumulated Depreciation			
Sale	2,000	Beg. Bal.	68,000
		Dep. Exp.	37,000
		End. Bal.	103,000

If the balance sheet had included specific plant asset accounts, such as Buildings and Equipment and their related accumulated depreciation accounts, or other long-term asset accounts, such as intangibles or natural resources, the analysis would have been the same.

Determining Cash Flows from Financing Activities



The third step in preparing the statement of cash flows is to determine cash flows from financing activities. The procedure is similar to the analysis of investing activities, including treatment of related gains or losses. The only difference is that the accounts to be analyzed are the short-term borrowings, long-term liabilities, and stockholders' equity accounts. Cash dividends from the statement of stockholders' equity must also be considered. Since Ryan Corporation does not have short-term borrowings, only long-term liabilities and stockholders' equity accounts are considered here. The following items from Exhibit 2 pertain to Ryan Corporation's financing activities in 20x1:

5. Issued \$100,000 of bonds at face value in a noncash exchange for plant assets.
6. Repaid \$50,000 of bonds at face value at maturity.
7. Issued 15,200 shares of \$5 par value common stock for \$150,000.
8. Paid cash dividends in the amount of \$8,000.

BONDS PAYABLE Exhibit 1 shows that Bonds Payable increased by \$50,000 in 20x1. This account is affected by items 5 and 6. Item 5 was analyzed in connection with plant assets. It is reported on the schedule of noncash investing and financing transactions (see Exhibit 4), but it must be remembered here in preparing the T account for Bonds Payable. Item 6 results in a cash outflow, which can be seen in the following transaction.

A = L + OE	Bonds Payable	50,000	
- -	Cash		50,000
	Repayment of bonds at face value at maturity		

Exhibit 4**Statement of Cash Flows:
Indirect Method**

Ryan Corporation
Statement of Cash Flows
For the Year Ended December 31, 20x1

Cash Flows from Operating Activities

Net Income		\$ 16,000
Adjustments to Reconcile Net Income to Net		
Cash Flows from Operating Activities		
Depreciation	\$ 37,000	
Gain on Sale of Investments	(12,000)	
Loss on Sale of Plant Assets	3,000	
Changes in Current Assets and Current Liabilities		
Decrease in Accounts Receivable	8,000	
Increase in Inventory	(34,000)	
Decrease in Prepaid Expenses	4,000	
Increase in Accounts Payable	7,000	
Increase in Accrued Liabilities	3,000	
Decrease in Income Taxes Payable	(2,000)	14,000
Net Cash Flows from Operating Activities		\$ 30,000

Cash Flows from Investing Activities

Purchase of Investments	(\$ 78,000)	
Sale of Investments	102,000	
Purchase of Plant Assets	(120,000)	
Sale of Plant Assets	5,000	
Net Cash Flows from Investing Activities		(91,000)

Cash Flows from Financing Activities

Repayment of Bonds	(\$ 50,000)	
Issue of Common Stock	150,000	
Dividends Paid	(8,000)	
Net Cash Flows from Financing Activities		92,000

Net Increase (Decrease) in Cash	\$ 31,000
Cash at Beginning of Year	15,000
Cash at End of Year	<u>\$ 46,000</u>

Schedule of Noncash Investing and Financing Transactions

Issue of Bonds Payable for Plant Assets	<u>\$100,000</u>
---	------------------

This cash outflow is shown in the financing activities section of the statement of cash flows as follows:

Repayment of Bonds (\$50,000)

The change in the Bonds Payable account can be explained as follows:

Bonds Payable			
Repayment	50,000	Beg. Bal.	245,000
		Noncash Issue	100,000
		End. Bal.	295,000

If Ryan Corporation had notes payable, either short-term or long-term, the analysis would be the same.

COMMON STOCK As with plant assets, related stockholders' equity accounts should be analyzed together. For example, Paid-in Capital in Excess of Par Value, Common should be examined with Common Stock. In 20x1 Ryan Corporation's Common Stock account increased by \$76,000 and Paid-in Capital in Excess of Par Value, Common increased by \$74,000. Those increases are explained by item 7 in the list on page 727, which states that Ryan Corporation issued 15,200 shares of stock for \$150,000.

The entry to record the cash inflow was as follows:

A = L + OE	Cash	150,000	
+	+	Common Stock	76,000
	+	Paid-in Capital in Excess of Par Value, Common	74,000
		Issued 15,200 shares of \$5 par value common stock	

The cash inflow is shown in the financing activities section of the statement of cash flows as follows:

Issue of Common Stock \$150,000

The analysis of this transaction is all that is needed to explain the changes in the two accounts during 20x1, as follows:

Common Stock		Paid-in Capital in Excess of Par Value, Common	
	Beg. Bal. 200,000		Beg. Bal. 115,000
	Issue 76,000		Issue 74,000
	End. Bal. 276,000		End. Bal. 189,000

RETAINED EARNINGS At this point in the analysis, several items that affect retained earnings have already been dealt with. For instance, in the case of Ryan Corporation, net income was used as part of the analysis of cash flows from operating activities. The only other item affecting the retained earnings of Ryan Corporation is the payment of \$8,000 in cash dividends (item 8 in the list on page 727), as reflected by the following transaction.

A = L + OE	Retained Earnings	8,000	
-	-	Cash	8,000
		Cash dividends for 20x1	

Ryan Corporation would have declared the dividend before paying it and therefore would have debited the Cash Dividends Declared account instead of Retained Earnings, but after paying the dividend and closing the Cash Dividends Declared account to Retained Earnings, the effect is as shown. Cash dividends are displayed in the financing activities section of the statement of cash flows:

Dividends Paid (\$8,000)

The following T account shows the change in the Retained Earnings account:

Retained Earnings			
Dividends	8,000	Beg. Bal.	132,000
		Net Income	16,000
		End. Bal.	140,000

Compiling the Statement of Cash Flows

OBJECTIVE

7 Use the indirect method to prepare a statement of cash flows



At this point in the analysis, all income statement items have been analyzed, all balance sheet changes have been explained, and all additional information has been taken into account. The resulting information may now be assembled into a statement of cash flows for Ryan Corporation, as presented in Exhibit 4. The Schedule of Noncash Investing and Financing Transactions is presented at the bottom of the statement.

Preparing the Work Sheet

SUPPLEMENTAL OBJECTIVE

8 Prepare a work sheet for the statement of cash flows



To assist in preparing the statement of cash flows for more complex companies, accountants have developed a work sheet approach. The work sheet approach uses the indirect method of determining cash flows from operating activities because of its basis in changes in the balance sheet accounts.

Procedures in Preparing the Work Sheet

The work sheet for Ryan Corporation is presented in Exhibit 5. The work sheet has four columns, labeled as follows:

Column A: Description

Column B: Account balances for the end of the prior year (20x0)

Column C: Analysis of transactions for the current year

Column D: Account balances for the end of the current year (20x1)

Five steps are followed in preparing the work sheet. As you read each one, refer to Exhibit 5.

1. Enter the account names from the balance sheets (Exhibit 1) in column A. Note that all accounts with debit balances are listed first, followed by all accounts with credit balances.
2. Enter the account balances for 20x0 in column B and the account balances for 20x1 in column D. In each column, total the debits and the credits. The total debits should equal the total credits in each column. (This is a check of whether all accounts were correctly transferred from the balance sheets.)
3. Below the data entered in step 2, insert the headings Cash Flows from Operating Activities, Cash Flows from Investing Activities, and Cash Flows from Financing Activities, leaving several lines of space between each one. As you do the analysis in step 4, write the results in the appropriate categories.
4. Analyze the changes in each balance sheet account, using information from both the income statement (see Exhibit 2) and other transactions affecting noncurrent accounts during 20x1. (The procedures for this analysis are presented in the next section.) Enter the results in the debit and credit columns. Identify each item with a letter. On the first line, identify the change in cash with an (x). In a complex situation, these letters will refer to a list of explanations on another working paper.
5. When all the changes in the balance sheet accounts have been explained, add the debit and credit columns in both the top and the bottom portions of column C. The debit and credit columns in the top portion should equal each other. They should *not* be equal in the bottom portion. If no errors have been

Exhibit 5

Work Sheet for the Statement of Cash Flows

Ryan Corporation
Work Sheet for Statement of Cash Flows
For the Year Ended December 31, 20x1

Description	Account Balances 12/31/x0	Analysis of Transactions		Account Balances 12/31/x1
		Debit	Credit	
Debits				
Cash	15,000	(x) 31,000		46,000
Accounts Receivable (net)	55,000		(b) 8,000	47,000
Inventory	110,000	(c) 34,000		144,000
Prepaid Expenses	5,000		(d) 4,000	1,000
Investments Available for Sale	127,000	(h) 78,000	(i) 90,000	115,000
Plant Assets	505,000	(j) 120,000	(k) 10,000	715,000
		(l) 100,000		
Total Debits	<u>817,000</u>			<u>1,068,000</u>
Credits				
Accumulated Depreciation	68,000	(k) 2,000	(m) 37,000	103,000
Accounts Payable	43,000		(e) 7,000	50,000
Accrued Liabilities	9,000		(f) 3,000	12,000
Income Taxes Payable	5,000	(g) 2,000		3,000
Bonds Payable	245,000	(n) 50,000	(l) 100,000	295,000
Common Stock	200,000		(o) 76,000	276,000
Paid-in Capital	115,000		(o) 74,000	189,000
Retained Earnings	132,000	(p) 8,000	(a) 16,000	140,000
Total Credits	<u>817,000</u>	<u>425,000</u>	<u>425,000</u>	<u>1,068,000</u>
Cash Flows from Operating Activities				
Net Income		(a) 16,000		
Decrease in Accounts Receivable		(b) 8,000		
Increase in Inventory			(c) 34,000	
Decrease in Prepaid Expenses		(d) 4,000		
Increase in Accounts Payable		(e) 7,000		
Increase in Accrued Liabilities		(f) 3,000		
Decrease in Income Taxes Payable			(g) 2,000	
Gain on Sale of Investments			(i) 12,000	
Loss on Sale of Plant Assets		(k) 3,000		
Depreciation Expense		(m) 37,000		
Cash Flows from Investing Activities				
Purchase of Investments			(h) 78,000	
Sale of Investments		(i) 102,000		
Purchase of Plant Assets			(j) 120,000	
Sale of Plant Assets		(k) 5,000		
Cash Flows from Financing Activities				
Repayment of Bonds			(n) 50,000	
Issue of Common Stock		(o) 150,000		
Dividends Paid			(p) 8,000	
		<u>335,000</u>	<u>304,000</u>	
Net Increase in Cash			(x) <u>31,000</u>	
		<u>335,000</u>	<u>335,000</u>	

made, the difference between columns in the bottom portion should equal the increase or decrease in the Cash account, identified with an (x) on the first line of the work sheet. Add this difference to the lesser of the two columns, and identify it as either an increase or a decrease in cash. Label the change with an (x) and compare it with the change in Cash on the first line of the work sheet, also labeled (x). The amounts should be equal, as they are in Exhibit 5, where the net increase in cash is \$31,000. Also, the new totals from the debit and credit columns should be equal.

When the work sheet is complete, the statement of cash flows may be prepared using the information in the lower half of the work sheet.

Analyzing the Changes in Balance Sheet Accounts

The most important step in preparing the work sheet is the analysis of the changes in the balance sheet accounts (step 4). Although a number of transactions and reclassifications must be analyzed and recorded, the overall procedure is systematic and not overly complicated. It is as follows:

1. Record net income.
2. Account for changes in current assets and current liabilities.
3. Use the information about other transactions to account for changes in non-current accounts.
4. Reclassify any other income and expense items not already dealt with.

In the following explanations, the identification letters refer to the corresponding transactions and reclassifications on the work sheet.

a. NET INCOME Net income results in an increase in Retained Earnings (entry a). Under the indirect method, it is the starting point for determining cash flows from operating activities. Under this method, additions and deductions are made to net income to arrive at cash flows from operating activities.

b–g. CHANGES IN CURRENT ASSETS AND CURRENT LIABILITIES Entries b to g record the effects on cash flows of the changes in current assets and current liabilities. In each case, there is a debit or credit to the current asset or current liability to account for the change from year to year and a corresponding debit or credit in the operating activities section of the work sheet. For example, work sheet entry b records the decrease in Accounts Receivable as a credit (decrease) to Accounts Receivable and as a debit in the operating activities section because the decrease has a positive effect on cash flows. Work sheet entries c–g reflect the effects on cash flows from operating activities of the changes in the other current assets and current liabilities. As you study these entries, note how the effects of each entry on cash flows are automatically determined by debits or credits reflecting changes in the balance sheet accounts.

h–i. INVESTMENTS Among the other transactions affecting noncurrent accounts during 20x1 (see Exhibit 2 on page 721), two pertain to investments. One is the purchase for \$78,000, and the other is the sale at \$102,000. The purchase (entry h) is recorded on the work sheet as a cash flow in the investing activities section. Note that instead of a credit to Cash, a credit entry with the appropriate designation is made in the appropriate section in the lower half of the work sheet. The sale transaction (entry i) is more complicated because it involves a gain that appears

on the income statement and is included in net income. This entry records the cash inflow in the investing activities section, accounts for the remaining difference in the Investments account, and removes the gain on sale of investments from net income.

j–m. PLANT ASSETS AND ACCUMULATED DEPRECIATION The four transactions that affect plant assets and the related accumulated depreciation are the purchase of plant assets, the sale of plant assets at a loss, the noncash exchange of bonds for plant assets, and the depreciation expense for the year. Because these transactions may appear complicated, it is important to work through them systematically when preparing the work sheet. First, the purchase of plant assets for \$120,000 is entered (entry j) in the same way the purchase of investments was entered in entry h. Second, the sale of plant assets (entry k) is similar to the sale of investments, except that a loss is involved. The cash inflow from this transaction is \$5,000. The rest of the entry is necessary in order to add the loss back into net income in the operating activities section of the statement of cash flows (since it was deducted to arrive at net income and no cash outflow resulted) and to record the effects on plant assets and accumulated depreciation.

The third transaction (entry l) is the noncash issue of bonds for the acquisition of plant assets. Note that this transaction does not affect Cash. Still, it needs to be recorded because the objective is to account for all changes in the balance sheet accounts. It is listed at the end of the statement of cash flows (Exhibit 4) in the schedule of noncash investing and financing transactions.

At this point, the increase of \$210,000 ($\$715,000 - \$505,000$) in plant assets has been explained by the two purchases less the sale ($\$120,000 + \$100,000 - \$10,000 = \$210,000$), but the change in Accumulated Depreciation has not been completely explained. The depreciation expense for the year needs to be entered (entry m). The debit is to the operating activities section of the work sheet because, as explained earlier in the chapter, no current cash outflow is required for depreciation expense. The effect of this debit is to add the amount for depreciation expense back into net income. The \$35,000 increase in Accumulated Depreciation has now been explained by the sale transaction and the depreciation expense ($-\$2,000 + \$37,000 = \$35,000$).

n. BONDS PAYABLE Part of the change in Bonds Payable was explained in entry l when a noncash transaction, a \$100,000 issue of bonds in exchange for plant assets, was entered. All that remains to be entered is the repayment (entry n).

o. COMMON STOCK AND PAID-IN CAPITAL IN EXCESS OF PAR VALUE, COMMON One transaction affects both these accounts. It is an issue of 15,200 shares of \$5 par value common stock for a total of \$150,000 (entry o).

p. RETAINED EARNINGS Part of the change in Retained Earnings was recognized when net income was entered (entry a). The only remaining effect to be recognized is the \$8,000 in cash dividends paid during the year (entry p).

x. CASH The final step is to total the debit and credit columns in the top and bottom portions of the work sheet and then to enter the net change in cash at the bottom of the work sheet. The columns in the upper half equal \$425,000. In the lower half, the debit column totals \$335,000 and the credit column totals \$304,000. The credit difference of \$31,000 (entry x) equals the debit change in cash on the first line of the work sheet.

The Direct Method of Preparing the Statement of Cash Flows

SUPPLEMENTAL OBJECTIVE

9 Use the direct method to determine cash flows from operating activities and prepare a statement of cash flows



To this point in the chapter, the indirect method of preparing the statement of cash flows has been used. In this section, the direct method is presented.

Determining Cash Flows from Operating Activities

The principal difference between the indirect and the direct methods appears in the cash flows from operating activities section of the statement of cash flows. As you have seen, the indirect method starts with net income from the income statement and converts it to net cash flows from operating activities by adding or subtracting items that do not affect net cash flows. The direct method takes a different approach. It converts each item on the income statement to its cash equivalent, as illustrated in Figure 3. For instance, sales are converted to cash receipts from sales, and purchases are converted to cash payments for purchases. Exhibit 6 shows the schedule of cash flows from operating activities under the direct method for Ryan Corporation. The conversion of the components of Ryan Corporation's income statement to those figures is explained in the following paragraphs.

CASH RECEIPTS FROM SALES Sales result in a positive cash flow for a company. Cash sales are direct cash inflows. Credit sales are not, because they are originally recorded as accounts receivable. When they are collected, they become cash inflows. You cannot, however, assume that credit sales are automatically inflows of cash, because the collections of accounts receivable in any one accounting period are not likely to equal credit sales. Receivables may be uncollectible, sales from a prior period may be collected in the current period, or sales from the current period may be collected in the next period. For example, if accounts receivable increase from one accounting period to the next, cash receipts from sales will not be as great as sales. On the other hand, if accounts receivable decrease from one accounting period to the next, cash receipts from sales will exceed sales.

The relationships among sales, changes in accounts receivable, and cash receipts from sales are reflected in the following formula:

$$\text{Cash Receipts from Sales} = \text{Sales} \begin{cases} + \text{Decrease in Accounts Receivable} \\ \text{or} \\ - \text{Increase in Accounts Receivable} \end{cases}$$

Refer to the balance sheets and income statement for Ryan Corporation in Exhibits 1 and 2. Note that sales were \$698,000 in 20x1 and that accounts receivable

Figure 3
Direct Method of
Determining Net Cash Flows
from Operating Activities

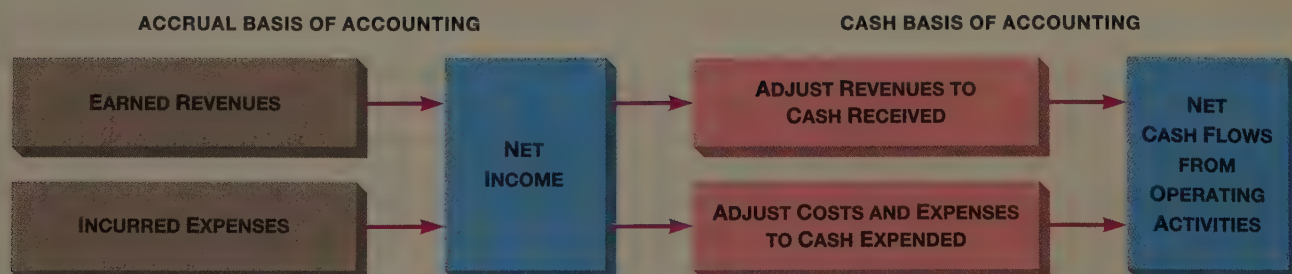


Exhibit 6
Schedule of Cash Flows
from Operating Activities:
Direct Method

Ryan Corporation			
Schedule of Cash Flows from Operating Activities			
For the Year Ended December 31, 20x1			
Cash Flows from Operating Activities			
Cash Receipts from			
Sales	\$706,000		
Interest Received	<u>6,000</u>		\$712,000
Cash Payments for			
Purchases	\$547,000		
Operating Expenses	103,000		
Interest	23,000		
Income Taxes	<u>9,000</u>		682,000
Net Cash Flows from Operating Activities			<u>\$ 30,000</u>

decreased by \$8,000. Thus, cash received from sales is \$706,000:

$$\$706,000 = \$698,000 + \$8,000$$

Collections were \$8,000 more than sales recorded for the year.

CASH RECEIPTS FROM INTEREST AND DIVIDENDS Although interest and dividends received are most closely associated with investment activity and are often called investment income, the FASB has decided to classify the cash received from these items as operating activities. To simplify the examples in this text, it is assumed that interest income equals interest received and that dividend income equals dividends received. Thus, based on Exhibit 2, interest received by Ryan Corporation is assumed to equal \$6,000, which is the amount of interest income.

CASH PAYMENTS FOR PURCHASES Cost of goods sold (from the income statement) must be adjusted for changes in two balance sheet accounts to arrive at cash payments for purchases. First, cost of goods sold must be adjusted for changes in inventory to arrive at net purchases. Then, net purchases must be adjusted for the change in accounts payable to arrive at cash payments for purchases. If inventory has increased from one accounting period to another, net purchases will be greater than cost of goods sold because net purchases during the period have exceeded the dollar amount of the items sold during the period. If inventory has decreased, net purchases will be less than cost of goods sold. Conversely, if accounts payable have increased, cash payments for purchases will be less than net purchases; if accounts payable have decreased, cash payments for purchases will be greater than net purchases.

These relationships may be stated in equation form as follows:

$$\text{Cash Payments for Purchases} = \text{Cost of Goods Sold} \left\{ \begin{array}{l} + \text{Increase in Inventory} \\ \text{or} \\ - \text{Decrease in Inventory} \end{array} \right\} \left\{ \begin{array}{l} + \text{Decrease in Accounts Payable} \\ \text{or} \\ - \text{Increase in Accounts Payable} \end{array} \right.$$

From Exhibits 1 and 2, cost of goods sold is \$520,000, inventory increased by \$34,000, and accounts payable increased by \$7,000. Thus, cash payments for purchases is \$547,000, as the following calculation shows:

$$\$547,000 = \$520,000 + \$34,000 - \$7,000$$

In this example, Ryan Corporation purchased \$34,000 more inventory than it sold and paid out \$7,000 less in cash than it made in purchases. The net result is that cash payments for purchases exceeded cost of goods sold by \$27,000 (\$547,000 – \$520,000).

CASH PAYMENTS FOR OPERATING EXPENSES Just as cost of goods sold does not represent the amount of cash paid for purchases during an accounting period, operating expenses do not match the amount of cash paid to employees, suppliers, and others for goods and services. Three adjustments must be made to operating expenses to arrive at the cash outflows. The first adjustment is for changes in prepaid expenses, such as prepaid insurance or prepaid rent. If prepaid assets increase during the accounting period, more cash will have been paid out than appears on the income statement as expenses. If prepaid assets decrease, the expenses shown on the income statement will exceed the cash spent.

The second adjustment is for changes in liabilities resulting from accrued expenses, such as wages payable and payroll taxes payable. If accrued liabilities increase during the accounting period, operating expenses on the income statement will exceed the cash spent. And if accrued liabilities decrease, operating expenses will fall short of cash spent.

The third adjustment is made because certain expenses do not require a current outlay of cash; those expenses must be subtracted from operating expenses to arrive at cash payments for operating expenses. The most common expenses in this category are depreciation expense, amortization expense, and depletion expense. For example, Ryan Corporation recorded 20x1 depreciation expense of \$37,000. No cash payment was made in this transaction. Therefore, to the extent that operating expenses include depreciation and similar items, an adjustment is needed to reduce operating expenses to the amount of cash expended.

The three adjustments to operating expenses are summarized in the equations that follow.

$$\begin{array}{l} \text{Cash Payments} \\ \text{for Operating} \\ \text{Expenses} \end{array} = \begin{array}{l} \text{Operating} \\ \text{Expenses} \end{array} \left\{ \begin{array}{l} + \text{ Increase in} \\ \text{Prepaid} \\ \text{Expenses} \\ \text{or} \\ - \text{ Decrease in} \\ \text{Prepaid} \\ \text{Expenses} \end{array} \right\} \left\{ \begin{array}{l} + \text{ Decrease in} \\ \text{Accrued} \\ \text{Liabilities} \\ \text{or} \\ - \text{ Increase in} \\ \text{Accrued} \\ \text{Liabilities} \end{array} \right\} \left\{ \begin{array}{l} - \text{ Depreciation} \\ \text{and Other} \\ \text{Noncash} \\ \text{Expenses} \end{array} \right\}$$

According to Exhibits 1 and 2, Ryan's operating expenses (including depreciation of \$37,000) were \$147,000, prepaid expenses decreased by \$4,000, and accrued liabilities increased by \$3,000. As a result, Ryan Corporation's cash payments for operating expenses are \$103,000, computed as follows:

$$\$103,000 = \$147,000 - \$4,000 - \$3,000 - \$37,000$$

If there are prepaid expenses and accrued liabilities that are *not* related to specific operating expenses, they are not included in these computations. One example is income taxes payable, which is the accrued liability related to income taxes expense. The cash payment for income taxes will be discussed shortly.

CASH PAYMENTS FOR INTEREST The FASB classifies cash payments for interest as operating activities, although some authorities argue that they should be considered financing activities because of their association with loans incurred to finance the business. The FASB feels that interest expense is a cost of operating a business,

and this is the position followed in this text. Also, for the sake of simplicity, all examples in this text assume that interest payments are equal to interest expense on the income statement. Thus, based on Exhibit 2, Ryan Corporation's interest payments are assumed to be \$23,000 in 20x1.

CASH PAYMENTS FOR INCOME TAXES The amount of income taxes expense that appears on the income statement rarely equals the amount of income taxes actually paid during the year. To determine cash payments for income taxes, income taxes (from the income statement) are adjusted by the change in Income Taxes Payable. If Income Taxes Payable increased during the accounting period, cash payments for taxes will be less than the expense shown on the income statement. If Income Taxes Payable decreased, cash payments for taxes will exceed income taxes on the income statement. In other words, the following equation is applicable:

$$\text{Cash Payments for Income Taxes} = \text{Income Taxes} \begin{cases} + \text{Decrease in Income Taxes Payable} \\ \text{or} \\ - \text{Increase in Income Taxes Payable} \end{cases}$$

In 20x1, Ryan Corporation showed income taxes of \$7,000 on its income statement and a decrease of \$2,000 in Income Taxes Payable on its balance sheets (see Exhibits 1 and 2). As a result, cash payments for income taxes during 20x1 were \$9,000, calculated as follows:

$$\$9,000 = \$7,000 + \$2,000$$

Compiling the Statement of Cash Flows

The Ryan Corporation's statement of cash flows under the direct method is presented in Exhibit 7. The only differences between that statement of cash flows and the one based on the indirect method shown in Exhibit 4 occur in the first and last sections. The middle sections, which present cash flows from investing activities and financing activities, net increases or decreases in cash, and the schedule of non-cash investing and financing activities, are the same under both methods.

The first section of the statement in Exhibit 7 shows the net cash flows from operating activities on a direct basis, as presented in Exhibit 6. The last section is the same as the cash flows from operating activities section of the statement of cash flows under the indirect method (see Exhibit 4 on page 728). The FASB believes that when the direct method is used, a schedule must be provided that reconciles net income to net cash flows from operating activities. Thus, the statement of cash flows under the direct method includes a section that accommodates the main difference between it and the indirect method.

Exhibit 7**Statement of Cash Flows:
Direct Method**

Ryan Corporation
Statement of Cash Flows
For the Year Ended December 31, 20x1

Cash Flows from Operating Activities

Cash Receipts from		
Sales	\$706,000	
Interest Received	6,000	\$712,000
Cash Payments for		
Purchases	\$547,000	
Operating Expenses	103,000	
Interest	23,000	
Income Taxes	9,000	682,000
Net Cash Flows from Operating Activities		\$ 30,000

Cash Flows from Investing Activities

Purchase of Investments	(\$ 78,000)	
Sale of Investments	102,000	
Purchase of Plant Assets	(120,000)	
Sale of Plant Assets	5,000	
Net Cash Flows from Investing Activities		(91,000)

Cash Flows from Financing Activities

Repayment of Bonds	(\$ 50,000)	
Issue of Common Stock	150,000	
Dividends Paid	(8,000)	
Net Cash Flows from Financing Activities		92,000
Net Increase (Decrease) in Cash		\$ 31,000
Cash at Beginning of Year		15,000
Cash at End of Year		\$ 46,000

Schedule of Noncash Investing and Financing Transactions

Issue of Bonds Payable for Plant Assets	\$100,000
--	------------------

Reconciliation of Net Income to Net Cash Flows from Operating Activities

Net Income	\$ 16,000
Adjustments to Reconcile Net Income to Net	
Cash Flows from Operating Activities	
Depreciation	\$ 37,000
Gain on Sale of Investments	(12,000)
Loss on Sale of Plant Assets	3,000
Changes in Current Assets and Current Liabilities	
Decrease in Accounts Receivable	8,000
Increase in Inventory	(34,000)
Decrease in Prepaid Expenses	4,000
Increase in Accounts Payable	7,000
Increase in Accrued Liabilities	3,000
Decrease in Income Taxes Payable	(2,000)
Net Cash Flows from Operating Activities	\$ 30,000

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

- 1. Describe the statement of cash flows, and define cash and cash equivalents.** The statement of cash flows explains the changes in cash and cash equivalents from one accounting period to the next by showing cash inflows and cash outflows from the operating, investing, and financing activities of a company for an accounting period. For purposes of preparing the statement of cash flows, *cash* is defined to include cash and cash equivalents. *Cash equivalents* are short-term (90 days or less), highly liquid investments, including money market accounts, commercial paper, and U.S. Treasury bills.
- 2. State the principal purposes and uses of the statement of cash flows.** The primary purpose of the statement of cash flows is to provide information about a company's cash receipts and cash payments during an accounting period. Its secondary purpose is to provide information about a company's operating, investing, and financing activities. The statement is useful to management as well as to investors and creditors in assessing the liquidity of a business, including its ability to generate future cash flows and to pay debts and dividends.
- 3. Identify the principal components of the classifications of cash flows, and state the significance of noncash investing and financing transactions.** Cash flows may be classified as stemming from (1) operating activities, which include the cash effects of transactions and other events that enter into the determination of net income; (2) investing activities, which include the acquiring and selling of long- and short-term marketable securities and property, plant, and equipment, and the making and collecting of loans, excluding interest; or (3) financing activities, which include the obtaining and returning or repaying of resources, excluding interest, to owners and creditors. Noncash investing and financing transactions are also important because they are exchanges of assets and/or liabilities that are of interest to investors and creditors when evaluating the financing and investing activities of a business.
- 4. Analyze the statement of cash flows.** In analyzing a company's statement of cash flows, analysts tend to focus on cash-generating efficiency and free cash flow. Cash-generating efficiency is a company's ability to generate cash from its current or continuing operations. Three ratios used in measuring cash-generating efficiency are cash flow yield, cash flows to sales, and cash flows to assets. Free cash flow is the cash that remains after deducting funds a company must commit to continue operating at its planned level. Such commitments must cover current or continuing operations, interest, income taxes, dividends, and net capital expenditures.
- 5. Use the indirect method to determine cash flows from operating activities.** Under the indirect method, net income is adjusted for all noncash effects and for items that need to be converted from an accrual to a cash basis to arrive at a cash flow basis, as follows:

Cash Flows from Operating Activities

Net Income		xxx
Adjustments to Reconcile Net Income to Net Cash		
Flows from Operating Activities		
(List of individual items)	xxx	xxx
Net Cash Flows from Operating Activities		xxx

SUPPLEMENTAL OBJECTIVES

- 6. Determine cash flows from investing activities and financing activities.** Cash flows from investing activities are determined by identifying the cash flow effects of the transactions that affect each account relevant to investing activities. Such accounts include all long-term assets and short-term marketable securities. The same procedure is followed for financing activities, except that the accounts involved are short-term borrowings, long-term liabilities, and stockholders' equity. The effects of gains and losses reported on the income statement must also be considered. After the changes in the balance sheet accounts from one accounting period to the next have been explained, all the cash flow effects should have been identified.
- 7. Use the indirect method to prepare a statement of cash flows.** The statement of cash flows lists cash flows from operating activities, investing activities, and financing activities, in that order. The sections on investing and financing activities are prepared by examining individual accounts involving cash receipts and cash payments from investing and financing activities to explain year-to-year changes in the account balances. Significant noncash transactions are included in a schedule of noncash investing and financing transactions that accompanies the statement of cash flows.
- 8. Prepare a work sheet for the statement of cash flows.** A work sheet is useful in preparing the statement of cash flows for complex companies. The basic procedures are to analyze the changes in the balance sheet accounts for their effects on cash flows (in the top portion of the work sheet) and to classify those effects according to the format of the statement of cash flows (in the lower portion of the work sheet). When all changes in the balance sheet accounts have been explained and entered on the work sheet, the change in the Cash account will also be explained, and all necessary information will be available to prepare the statement of cash flows. The work sheet approach lends itself to the indirect method of preparing the statement of cash flows.
- 9. Use the direct method to determine cash flows from operating activities and prepare a statement of cash flows.** The principal difference between a statement of cash flows prepared under the direct method and one prepared under the indirect method appears in the cash flows from operating activities section. Instead of beginning with net income and making additions and subtractions, as is done with the indirect method, the direct method converts each item on the income statement to its cash equivalent by adjusting for changes in the related current asset or current liability accounts and for other items such as depreciation. The rest of the statement of cash flows is the same under the direct method, except that a schedule that reconciles net income to net cash flows from operating activities must be included.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- | | |
|-------------|---|
| LO 1 | Cash: For purposes of the statement of cash flows, both cash and cash equivalents. |
| LO 1 | Cash equivalents: Short-term (90 days or less), highly liquid investments, including money market accounts, commercial paper, and U.S. Treasury bills. |
| LO 4 | Cash flows to assets: The ratio of net cash flows from operating activities to average total assets. |
| LO 4 | Cash flows to sales: The ratio of net cash flows from operating activities to sales. |
| LO 4 | Cash flow yield: The ratio of net cash flows from operating activities to net income. |
| LO 4 | Cash-generating efficiency: The ability of a company to generate cash from its current or continuing operations. |

- LO 5 Direct method:** The procedure for converting the income statement from an accrual basis to a cash basis by separately adjusting each item on the income statement.
- LO 3 Financing activities:** Business activities that involve obtaining resources from or returning resources to owners and providing them with a return on their investment, and obtaining resources from creditors and repaying any amounts borrowed or otherwise settling the obligations.
- LO 4 Free cash flow:** The amount of cash that remains after deducting the funds a company must commit to continue operating at its planned level; net cash flows from operating activities minus dividends paid minus net capital expenditures.
- LO 5 Indirect method:** The procedure for converting the income statement from an accrual basis to a cash basis by adjusting net income for items that do not affect cash flows, including depreciation, amortization, depletion, gains, losses, and changes in current assets and current liabilities.
- LO 3 Investing activities:** Business activities that involve the acquiring and selling of long-term assets, the acquiring and selling of marketable securities other than trading securities or cash equivalents, and the making and collecting of loans.
- LO 3 Noncash investing and financing transactions:** Significant investing and financing transactions that do not involve an actual cash inflow or outflow but involve only long-term assets, long-term liabilities, or stockholders' equity, such as the exchange of a long-term liability for a long-term asset or the settlement of a debt by issuing capital stock.
- LO 3 Operating activities:** Business activities that involve the cash effects of transactions and other events that enter into the determination of net income.
- LO 1 Statement of cash flows:** A primary financial statement that shows how a company's operating, investing, and financing activities have affected cash during an accounting period.

REVIEW PROBLEM

LO 4
LO 5
LO 6
LO 7
SO 9

The Statement of Cash Flows

The 20x2 income statement for Northwest Corporation is presented below, and the comparative balance sheets for the years 20x2 and 20x1 are shown on the next page.

Northwest Corporation Income Statement For the Year Ended December 31, 20x2			
Net Sales			\$1,650,000
Cost of Goods Sold			920,000
Gross Margin			\$ 730,000
Operating Expenses (including Depreciation Expense of \$12,000 on Buildings and \$23,100 on Equipment, and Amortization Expense of \$4,800)			470,000
Operating Income			\$ 260,000
Other Income (Expenses)			
Interest Expense	(\$55,000)		
Dividend Income	3,400		
Gain on Sale of Investments	12,500		
Loss on Disposal of Equipment	(2,300)		(41,400)
Income Before Income Taxes			\$ 218,600
Income Taxes			52,200
Net Income			\$ 166,400

Northwest Corporation
Comparative Balance Sheets
December 31, 20x2 and 20x1

	20x2	20x1	Change	Increase or Decrease
Assets				
Cash	\$ 115,850	\$ 121,850	(\$ 6,000)	Decrease
Accounts Receivable (net)	296,000	314,500	(18,500)	Decrease
Inventory	322,000	301,000	21,000	Increase
Prepaid Expenses	7,800	5,800	2,000	Increase
Long-Term Investments	36,000	86,000	(50,000)	Decrease
Land	150,000	125,000	25,000	Increase
Buildings	462,000	462,000	—	—
Accumulated Depreciation, Buildings	(91,000)	(79,000)	(12,000)	Increase
Equipment	159,730	167,230	(7,500)	Decrease
Accumulated Depreciation, Equipment	(43,400)	(45,600)	2,200	Decrease
Intangible Assets	19,200	24,000	(4,800)	Decrease
Total Assets	\$1,434,180	\$1,482,780	(\$ 48,600)	
Liabilities and Stockholders' Equity				
Accounts Payable	\$ 133,750	\$ 233,750	(\$100,000)	Decrease
Notes Payable (current)	75,700	145,700	(70,000)	Decrease
Accrued Liabilities	5,000	—	5,000	Increase
Income Taxes Payable	20,000	—	20,000	Increase
Bonds Payable	210,000	310,000	(100,000)	Decrease
Mortgage Payable	330,000	350,000	(20,000)	Decrease
Common Stock, \$10 par value	360,000	300,000	60,000	Increase
Paid-in Capital in Excess of Par Value	90,000	50,000	40,000	Increase
Retained Earnings	209,730	93,330	116,400	Increase
Total Liabilities and Stockholders' Equity	\$1,434,180	\$1,482,780	(\$ 48,600)	

The following additional information was taken from the company's records:

- Long-term investments (available-for-sale securities) that cost \$70,000 were sold at a gain of \$12,500; additional long-term investments were made in the amount of \$20,000.
- Five acres of land were purchased for \$25,000 to build a parking lot.
- Equipment that cost \$37,500 with accumulated depreciation of \$25,300 was sold at a loss of \$2,300; new equipment costing \$30,000 was purchased.
- Notes payable in the amount of \$100,000 were repaid; an additional \$30,000 was borrowed by signing notes payable.
- Bonds payable in the amount of \$100,000 were converted into 6,000 shares of common stock.
- The Mortgage Payable account was reduced by \$20,000 during the year.
- Cash dividends declared and paid were \$50,000.

REQUIRED

- Prepare a schedule of cash flows from operating activities using the (a) indirect method and (b) direct method.
- Prepare a statement of cash flows using the indirect method.
- Compute cash flow yield, cash flows to sales, cash flows to assets, and free cash flow for 20x2.

ANSWER TO REVIEW PROBLEM

1. (a) Prepare a schedule of cash flows from operating activities using the indirect method.

Northwest Corporation		
Schedule of Cash Flows from Operating Activities		
For the Year Ended December 31, 20x2		
Cash Flows from Operating Activities		
Net Income		\$166,400
Adjustments to Reconcile Net Income to		
Net Cash Flows from Operating Activities		
Depreciation Expense, Buildings	\$ 12,000	
Depreciation Expense, Equipment	23,100	
Amortization Expense, Intangible Assets	4,800	
Gain on Sale of Investments	(12,500)	
Loss on Disposal of Equipment	2,300	
Changes in Current Assets		
and Current Liabilities		
Decrease in Accounts Receivable	18,500	
Increase in Inventory	(21,000)	
Increase in Prepaid Expenses	(2,000)	
Decrease in Accounts Payable	(100,000)	
Increase in Accrued Liabilities	5,000	
Increase in Income Taxes Payable	20,000	(49,800)
Net Cash Flows from Operating Activities		<u>\$116,600</u>

1. (b) Prepare a schedule of cash flows from operating activities using the direct method.

Northwest Corporation		
Schedule of Cash Flows from Operating Activities		
For the Year Ended December 31, 20x2		
Cash Flows from Operating Activities		
Cash Receipts from		
Sales	\$1,668,500 ¹	
Dividends Received	3,400	\$1,671,900
Cash Payments for		
Purchases	\$1,041,000 ²	
Operating Expenses	427,100 ³	
Interest	55,000	
Income Taxes	32,200 ⁴	1,555,300
Net Cash Flows from Operating Activities		<u>\$ 116,600</u>

1. $\$1,650,000 + \$18,500 = \$1,668,500$

2. $\$920,000 + \$21,000 + \$100,000 = \$1,041,000$

3. $\$470,000 + \$2,000 - \$5,000 - (\$12,000 + \$23,100 + \$4,800) = \$427,100$

4. $\$52,200 - \$20,000 = \$32,200$

2. Prepare a statement of cash flows using the indirect method.

Northwest Corporation	
Statement of Cash Flows	
For the Year Ended December 31, 20x2	
Cash Flows from Operating Activities	
Net Income	\$166,400
Adjustments to Reconcile Net Income to	
Net Cash Flows from Operating Activities	
Depreciation Expense, Buildings	\$ 12,000
Depreciation Expense, Equipment	23,100
Amortization Expense, Intangible Assets	4,800
Gain on Sale of Investments	(12,500)
Loss on Disposal of Equipment	2,300
Changes in Current Assets and	
Current Liabilities	
Decrease in Accounts Receivable	18,500
Increase in Inventory	(21,000)
Increase in Prepaid Expenses	(2,000)
Decrease in Accounts Payable	(100,000)
Increase in Accrued Liabilities	5,000
Increase in Income Taxes Payable	20,000
Net Cash Flows from Operating Activities	\$116,600
Cash Flows from Investing Activities	
Sale of Long-Term Investments	\$ 82,500 ¹
Purchase of Long-Term Investments	(20,000)
Purchase of Land	(25,000)
Sale of Equipment	9,900 ²
Purchase of Equipment	(30,000)
Net Cash Flows from Investing Activities	17,400
Cash Flows from Financing Activities	
Repayment of Notes Payable	(\$100,000)
Issuance of Notes Payable	30,000
Reduction in Mortgage	(20,000)
Dividends Paid	(50,000)
Net Cash Flows from Financing Activities	(140,000)
Net Increase (Decrease) in Cash	(\$ 6,000)
Cash at Beginning of Year	121,850
Cash at End of Year	<u>\$115,850</u>
Schedule of Noncash Investing and Financing Transactions	
Conversion of Bonds Payable into Common Stock	<u>\$100,000</u>

1. $\$70,000 + \$12,500 \text{ (gain)} = \$82,500$

2. $\$37,500 - \$25,300 = \$12,200 \text{ (book value)} - \$2,300 \text{ (loss)} = \$9,900$

3. Compute cash flow yield, cash flows to sales, cash flows to assets, and free cash flow for 20x2.

$$\text{Cash Flow Yield} = \frac{\$116,600}{\$166,400} = .7 \text{ times}$$

$$\text{Cash Flows to Sales} = \frac{\$116,600}{\$1,650,000} = 7.1\%$$

$$\text{Cash Flows to Assets} = \frac{\$116,600}{(\$1,434,180 + \$1,482,780) \div 2} = 8.0\%$$

$$\begin{aligned}\text{Free Cash Flow} &= \$116,600 - \$50,000 - \$25,000 - \$30,000 + \$9,900 \\ &= \$21,500\end{aligned}$$

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. In the statement of cash flows, what is the term *cash* understood to include?
2. To earn a return on cash on hand during 20x3, Sallas Corporation transferred \$45,000 from its checking account to a money market account, purchased a \$25,000 Treasury bill, and invested \$35,000 in common stocks. How will each of these transactions affect the statement of cash flows?
3. What are the purposes of the statement of cash flows?
4. Why is the statement of cash flows needed when most of the information in it is available from a company's comparative balance sheets and income statement?
5. What are the three classifications of cash flows? Give some examples of each.
6. Why is it important to disclose certain noncash transactions? How should they be disclosed?
7. Define *cash-generating efficiency* and identify three ratios that measure cash-generating efficiency.
8. Define *free cash flow* and identify its components. What does it mean to have a positive or a negative free cash flow?
9. What are the essential differences between the direct method and the indirect method of determining cash flows from operations?
10. In determining net cash flows from operating activities (assuming the indirect method is used), what are the effects on cash generated from the following items: (a) an increase in accounts receivable, (b) a decrease in inventory, (c) an increase in accounts payable, (d) a decrease in wages payable, (e) depreciation expense, and (f) amortization of patents?
11. Cell-Borne Corporation had a net loss of \$12,000 in 20x1 but had positive cash flows from operations of \$9,000. What conditions may have caused this situation?
12. What is the proper treatment on the statement of cash flows of a transaction in which a building that cost \$50,000 with accumulated depreciation of \$32,000 is sold at a loss of \$5,000?
13. What is the proper treatment on the statement of cash flows of (a) a transaction in which buildings and land are purchased by the issuance of a mortgage for \$234,000 and (b) a conversion of \$50,000 in bonds payable into 2,500 shares of \$6 par value common stock?
14. Why is the work sheet approach considered to be more compatible with the indirect method than with the direct method of determining cash flows from operations?
15. Assuming in each of the following independent cases that only one transaction occurred, what transactions would be likely to cause (a) a decrease in investments and (b) an increase in common stock? How would each case be treated on the work sheet for the statement of cash flows?

16. Glen Corporation has the following other income and expense items: interest expense, \$12,000; interest income, \$3,000; dividend income, \$5,000; and loss on the retirement of bonds, \$6,000. Where does each of these items appear on or affect the statement of cash flows, assuming the direct method is used?

SHORT EXERCISES

- LD 3 Classification of Cash Flow Transactions** **SE 1.** Tosca Corporation engaged in the transactions below. Identify each as (a) an operating activity, (b) an investing activity, (c) a financing activity, (d) a noncash transaction, or (e) none of the above.
1. Sold land.
 2. Declared and paid a cash dividend.
 3. Paid interest.
 4. Issued common stock for plant assets.
 5. Issued preferred stock.
 6. Borrowed cash on a bank loan.
- LD 4 Cash-Generating Efficiency Ratios and Free Cash Flow** **SE 2.** In 20x2, Wu Corporation had year-end assets of \$550,000, net sales of \$790,000, net income of \$90,000, net cash flows from operating activities of \$180,000, purchases of plant assets of \$120,000, sales of plant assets of \$20,000, and paid dividends of \$40,000. In 20x1, year-end assets were \$500,000. Calculate the cash-generating efficiency ratios of cash flow yield, cash flows to sales, and cash flows to assets. Also calculate free cash flow.
- LD 4 Cash Flow Efficiency and Free Cash Flow** **SE 3.** Examine the cash flow measures in part 3 of the review problem in this chapter. Discuss the meaning of these ratios.
- LD 5 Computing Cash Flows from Operating Activities: Indirect Method** **SE 4.** Specialty Products Corporation had a net income of \$33,000 during 20x1. During the year, the company had depreciation expense of \$14,000. Accounts receivable increased by \$11,000, and accounts payable increased by \$5,000. Those were the company's only current assets and current liabilities. Use the indirect method to determine net cash flows from operating activities.
- LD 5 Computing Cash Flows from Operating Activities: Indirect Method** **SE 5.** During 20x1, Ayzarian Corporation had a net income of \$72,000. Included on the income statement was depreciation expense of \$8,000 and amortization expense of \$900. During the year, accounts receivable decreased by \$4,100, inventories increased by \$2,700, prepaid expenses decreased by \$500, accounts payable decreased by \$7,000, and accrued liabilities decreased by \$850. Use the indirect method to determine net cash flows from operating activities.
- LD 6 Cash Flows from Investing Activities and Noncash Transactions** **SE 6.** During 20x1, Rhode Island Company purchased land for \$750,000. It paid \$250,000 in cash and signed a \$500,000 mortgage for the rest. The company also sold a building that had originally cost \$180,000, on which it had \$140,000 of accumulated depreciation, for \$190,000 cash and a gain of \$150,000. Prepare the cash flows from investing activities and schedule of noncash investing and financing transactions sections of the statement of cash flows.
- LD 6 Cash Flows from Financing Activities** **SE 7.** During 20x1, South Carolina Company issued \$1,000,000 in long-term bonds at 96, repaid \$150,000 of bonds at face value, paid interest of \$80,000, and paid dividends of \$50,000. Prepare the cash flows from the financing activities section of the statement of cash flows.
- LD 7 Identifying Components of the Statement of Cash Flows** **SE 8.** Assuming the indirect method is used to prepare the statement of cash flows, tell whether each of the following items would appear (a) in cash flows from operating activities, (b) in cash flows from investing activities, (c) in cash flows from financing activities, (d) in the schedule of noncash investing and financing transactions, or (e) not on the statement of cash flows at all.
1. Dividends paid
 2. Cash receipts from sales
 3. Decrease in accounts receivable
 4. Sale of plant assets

5. Gain on sale of investment
6. Issue of stock for plant assets
7. Issue of common stock
8. Net income

SO 9 Cash Receipts from Sales and Cash Payments for Purchases: Direct Method

SE 9.

During 20x2, Nebraska Wheat Company, a marketer of whole-grain products, had sales of \$426,500. The ending balance of Accounts Receivable was \$127,400 in 20x1 and \$96,200 in 20x2. Also, during 20x2, Nebraska Wheat Company had cost of goods sold of \$294,200. The ending balance of inventory was \$36,400 in 20x1 and \$44,800 in 20x2. The ending balance of Accounts Payable was \$28,100 in 20x1 and \$25,900 in 20x2.

Using the direct method, calculate cash receipts from sales and cash payments for purchases in 20x2.

SO 9 Cash Payments for Operating Expenses and Income Taxes: Direct Method

SE 10.

During 20x2, Nebraska Wheat Company had operating expenses of \$79,000 and income taxes expense of \$12,500. Depreciation expense of \$20,000 for 20x2 was included in operating expenses. The ending balance of Prepaid Expenses was \$3,600 in 20x1 and \$2,300 in 20x2. The ending balance of Accrued Liabilities (excluding Income Taxes Payable) was \$3,000 in 20x1 and \$2,000 in 20x2. The ending balance of Income Taxes Payable was \$4,100 in 20x1 and \$3,500 in 20x2.

Calculate cash payments for operating expenses and income taxes in 20x2 using the direct method.

EXERCISES

LO 1 Classification of Cash Flow Transactions

E 1. Smelt Corporation engaged in the following transactions. Identify each as (a) an operating activity, (b) an investing activity, (c) a financing activity, (d) a noncash transaction, or (e) not on the statement of cash flows. (Assume the indirect method.)

1. Declared and paid a cash dividend.
2. Purchased a long-term investment.
3. Received cash from customers.
4. Paid interest.
5. Sold equipment at a loss.
6. Issued long-term bonds for plant assets.
7. Received dividends on securities held.
8. Issued common stock.
9. Declared and issued a stock dividend.
10. Repaid notes payable.
11. Paid employees their wages.
12. Purchased a 60-day Treasury bill.
13. Purchased land.

LO 4 Cash-Generating Efficiency Ratios and Free Cash Flow

E 2.

In 20x5, Wicker Corporation had year-end assets of \$4,800,000, net sales of \$6,600,000, net income of \$560,000, net cash flows from operating activities of \$780,000, dividends of \$240,000, and net capital expenditures of \$820,000. In 20x4, year-end assets were \$4,200,000. Calculate the cash-generating efficiency ratios of cash flow yield, cash flows to sales, and cash flows to assets. Also calculate free cash flow.

LO 5 Cash Flows from Operating Activities: Indirect Method

E 3.

The condensed single-step income statement for the year ended December 31, 20x2, of Green Fields Chem Company, a distributor of farm fertilizers and herbicides, appears as follows:

Sales		\$6,500,000
Less: Cost of Goods Sold	\$3,800,000	
Operating Expenses (including depreciation of \$410,000)	1,900,000	
Income Taxes	200,000	5,900,000
Net Income		<u>\$ 600,000</u>

Selected accounts from the company's balance sheets for 20x2 and 20x1 are as follows:

	20x2	20x1
Accounts Receivable	\$1,200,000	\$850,000
Inventory	420,000	510,000
Prepaid Expenses	130,000	90,000
Accounts Payable	480,000	360,000
Accrued Liabilities	30,000	50,000
Income Taxes Payable	70,000	60,000

Present in good form a schedule of cash flows from operating activities using the indirect method.

L0 5 Computing Cash Flows from Operating Activities: Indirect Method

- E 4.** During 20x1, Boulevard Corporation had a net income of \$41,000. Included on the income statement was depreciation expense of \$2,300 and amortization expense of \$300. During the year, accounts receivable increased by \$3,400, inventories decreased by \$1,900, prepaid expenses decreased by \$200, accounts payable increased by \$5,000, and accrued liabilities decreased by \$450. Determine net cash flows from operating activities using the indirect method.

L0 5 Preparing a Schedule of Cash Flows from Operating Activities: Indirect Method

- E 5.** For the year ended June 30, 20xx, net income for Norris Corporation was \$7,400. The following is additional information: (a) Depreciation expense was \$2,000; (b) accounts receivable increased by \$4,400 during the year; (c) inventories increased by \$7,000, and accounts payable increased by \$14,000 during the year; (d) prepaid rent decreased by \$1,400, and salaries payable increased by \$1,000; and (e) income taxes payable decreased by \$600 during the year. Use the indirect method to prepare a schedule of cash flows from operating activities.

L0 6 Computing Cash Flows from Investing Activities: Investments

- E 6.** Wix Company's T account for long-term available-for-sale investments at the end of 20x3 is as follows:

Investments			
Beg. Bal.	38,500	Sales	39,000
Purchases	58,000		
End. Bal.	57,500		

In addition, Wix's income statement shows a loss on the sale of investments of \$6,500. Compute the amounts to be shown as cash flows from investing activities and show how they are to appear in the statement of cash flows.

L0 6 Computing Cash Flows from Investing Activities: Plant Assets

- E 7.** The T accounts for plant assets and accumulated depreciation for Wix Company at the end of 20x3 are as follows:

Plant Assets				Accumulated Depreciation			
Beg. Bal.	65,000	Disposals	23,000	Disposals	14,700	Beg. Bal.	34,500
Purchases	33,600					Depreciation	10,200
End. Bal.	75,600					End. Bal.	30,000

In addition, Wix Company's income statement shows a gain on sale of plant assets of \$4,400. Compute the amounts to be shown as cash flows from investing activities and show how they are to appear on the statement of cash flows.

L0 6 Determining Cash Flows from Investing and Financing Activities

- E 8.** All transactions involving Notes Payable and related accounts engaged in by Wix Company during 20x3 are as follows:

Cash	18,000	
Notes Payable		18,000
Bank loan		
Patent	30,000	
Notes Payable		30,000
Purchase of patent by issuing note payable		

Notes Payable	5,000	
Interest Expense	500	
Cash		5,500
Repayment of note payable at maturity		

Determine the amounts of the transactions affecting financing activities and show how they are to appear on the statement of cash flows for 20x3.

LO 7 Preparing the Statement of Cash Flows: Indirect Method

E 9. Tham Corporation's 20x2 income statement and its comparative balance sheets for June 30, 20x2 and 20x1, are as follows:

**Tham Corporation
Income Statement
For the Year Ended June 30, 20x2**

Sales	\$468,000
Cost of Goods Sold	312,000
Gross Margin	\$156,000
Operating Expenses	90,000
Operating Income	\$ 66,000
Interest Expense	5,600
Income Before Income Taxes	\$ 60,400
Income Taxes	24,600
Net Income	<u>\$ 35,800</u>

**Tham Corporation
Comparative Balance Sheets
June 30, 20x2 and 20x1**

	20x2	20x1
Assets		
Cash	\$139,800	\$ 25,000
Accounts Receivable (net)	42,000	52,000
Inventory	86,800	96,800
Prepaid Expenses	6,400	5,200
Furniture	110,000	120,000
Accumulated Depreciation, Furniture	(18,000)	(10,000)
Total Assets	<u>\$367,000</u>	<u>\$289,000</u>
Liabilities and Stockholders' Equity		
Accounts Payable	\$ 26,000	\$ 28,000
Income Taxes Payable	2,400	3,600
Notes Payable (long-term)	74,000	70,000
Common Stock, \$10 par value	230,000	180,000
Retained Earnings	34,600	7,400
Total Liabilities and Stockholders' Equity	<u>\$367,000</u>	<u>\$289,000</u>

Additional information: (a) Issued \$44,000 note payable for purchase of furniture; (b) sold furniture that cost \$54,000 with accumulated depreciation of \$30,600 at carrying value; (c) recorded depreciation on the furniture during the year, \$38,600; (d) repaid a note in the amount of \$40,000; (e) issued \$50,000 of common stock at par value; and (f) declared and paid dividends of \$8,600. Without using a work sheet, prepare a statement of cash flows for 20x2 using the indirect method.

LO 7 Preparing a Work Sheet
SO 8 for the Statement of Cash
 Flows: Indirect Method

E 10. Using the information in E 9, prepare a work sheet for the statement of cash flows for Tham Corporation for 20x2. From the work sheet, prepare a statement of cash flows using the indirect method.

SO 9 Computing Cash Flows
 from Operating Activities:
 Direct Method

E 11. Vlieg Corporation engaged in the following transactions in 20x2. Using the direct method, compute the various cash flows from operating activities as required.

- During 20x2, Vlieg Corporation had cash sales of \$41,300 and sales on credit of \$123,000. During the same year, accounts receivable decreased by \$18,000. Determine the cash receipts from sales during 20x2.
- During 20x2, Vlieg Corporation's cost of goods sold was \$119,000. During the same year, merchandise inventory increased by \$12,500 and accounts payable decreased by \$4,300. Determine the cash payments for purchases during 20x2.
- During 20x2, Vlieg Corporation had operating expenses of \$45,000, including depreciation of \$15,600. Also during 20x2, related prepaid expenses decreased by \$3,100 and relevant accrued liabilities increased by \$1,200. Determine the cash payments for operating expenses to suppliers of goods and services during 20x2.
- Vlieg Corporation's income taxes expense for 20x2 was \$4,300. Income taxes payable decreased by \$230 that year. Determine the cash payments for income taxes during 20x2.

SO 9 Preparing a Schedule of
 Cash Flows from Operating
 Activities: Direct Method

E 12. The income statement for the Vasquez Corporation is as follows:

Vasquez Corporation Income Statement For the Year Ended June 30, 20xx			
Sales			\$122,000
Cost of Goods Sold			60,000
Gross Margin			\$ 62,000
Operating Expenses			
Salaries Expense	\$32,000		
Rent Expense	16,800		
Depreciation Expense	2,000		
			50,800
Income Before Income Taxes			\$ 11,200
Income Taxes			2,400
Net Income			\$ 8,800

Additional information: (a) Accounts receivable increased by \$4,400 during the year; (b) inventories increased by \$7,000, and accounts payable increased by \$14,000 during the year; (c) prepaid rent decreased by \$1,400, while salaries payable increased by \$1,000; and (d) income taxes payable decreased by \$600 during the year. Using the direct method, prepare a schedule of cash flows from operating activities as illustrated in Exhibit 6.

PROBLEMS

- P 1.** Analyze each transaction below and place X's in the appropriate columns to indicate its classification and its effect on cash flows using the indirect method.

LO 1 Classification of
LO 3 Transactions

Transaction	Cash Flow Classification				Effect on Cash		
	Operating Activity	Investing Activity	Financing Activity	Noncash Transaction	Increase	Decrease	No Effect
1. Incurred a net loss.							
2. Declared and issued a stock dividend.							
3. Paid a cash dividend.							
4. Collected accounts receivable.							
5. Purchased inventory with cash.							
6. Retired long-term debt with cash.							
7. Sold available-for-sale securities at a loss.							
8. Issued stock for equipment.							
9. Purchased a one-year insurance policy with cash.							
10. Purchased treasury stock with cash.							
11. Retired a fully depreciated truck (no gain or loss).							
12. Paid interest on note.							
13. Received cash dividend on investment.							
14. Sold treasury stock.							
15. Paid income taxes.							
16. Transferred cash to money market account.							
17. Purchased land and building with a mortgage.							

LO 4 The Statement of Cash
LO 7 Flows: Indirect Method

- P 2.** The comparative balance sheets for Sharma Fabrics, Inc., for December 31, 20x3 and 20x2, appear on the next page. Additional information about Sharma Fabrics' operations during 20x3 is as follows: (a) net income, \$56,000; (b) building and equipment depreciation expense amounts, \$30,000 and \$6,000, respectively; (c) equipment that cost \$27,000 with accumulated depreciation of \$25,000 sold at a gain of \$10,600; (d) equipment purchases, \$25,000; (e) patent amortization, \$6,000; purchase of patent, \$2,000; (f) funds borrowed by issuing notes payable, \$50,000; notes payable repaid, \$30,000; (g) land and building purchased for \$324,000 by signing a mortgage for the total cost; (h) 3,000 shares of \$20 par value common stock issued for a total of \$100,000; and (i) paid cash dividend, \$18,000.

REQUIRED

1. Using the indirect method, prepare a statement of cash flows for Sharma Fabrics, Inc. (Do not use a work sheet.)

- Why did Sharma Fabrics have an increase in cash of \$134,400 when it recorded net income of \$56,000? Discuss and interpret.
- Compute and assess cash flow yield and free cash flow for 20x3.

Sharma Fabrics, Inc.
Comparative Balance Sheets
December 31, 20x3 and 20x2

	20x3	20x2
Assets		
Cash	\$189,120	\$ 54,720
Accounts Receivable (net)	204,860	150,860
Inventory	225,780	275,780
Prepaid Expenses	—	40,000
Land	50,000	—
Building	274,000	—
Accumulated Depreciation, Building	(30,000)	—
Equipment	66,000	68,000
Accumulated Depreciation, Equipment	(29,000)	(48,000)
Patents	8,000	12,000
Total Assets	<u>\$958,760</u>	<u>\$553,360</u>
Liabilities and Stockholders' Equity		
Accounts Payable	\$ 21,500	\$ 73,500
Notes Payable	20,000	—
Accrued Liabilities (current)	—	24,600
Mortgage Payable	324,000	—
Common Stock, \$20 par value	360,000	300,000
Paid-in Capital in Excess of Par Value	114,400	74,400
Retained Earnings	118,860	80,860
Total Liabilities and Stockholders' Equity	<u>\$958,760</u>	<u>\$553,360</u>

LO 4 Statement of Cash Flows:
LO 7 Indirect Method



- P 3.** The comparative balance sheets for Karidis Ceramics, Inc., for December 31, 20x3 and 20x2, appear on the next page. The following is additional information about Karidis Ceramics' operations during 20x3: (a) net income was \$96,000; (b) building and equipment depreciation expense amounts were \$80,000 and \$60,000, respectively; (c) intangible assets were amortized in the amount of \$20,000; (d) investments in the amount of \$116,000 were purchased; (e) investments were sold for \$150,000, on which a gain of \$34,000 was recorded; (f) the company issued \$240,000 in long-term bonds at face value; (g) a small warehouse building with the accompanying land was purchased through the issue of a \$320,000 mortgage; (h) the company paid \$40,000 to reduce mortgage payable during 20x3; (i) the company borrowed funds in the amount of \$60,000 by issuing notes payable and repaid notes payable in the amount of \$180,000; and (j) cash dividends in the amount of \$36,000 were declared and paid.

REQUIRED

- Using the indirect method, prepare a statement of cash flows for Karidis Ceramics. (Do not use a work sheet.)
- Why did Karidis Ceramics experience a decrease in cash in a year in which it had a net income of \$96,000? Discuss and interpret.
- Compute and assess cash flow yield and free cash flow for 20x3.

Karidis Ceramics, Inc. Comparative Balance Sheets December 31, 20x3 and 20x2		
	20x3	20x2
Assets		
Cash	\$ 277,600	\$ 305,600
Accounts Receivable (net)	738,800	758,800
Inventory	960,000	800,000
Prepaid Expenses	14,800	26,800
Long-Term Investments	440,000	440,000
Land	361,200	321,200
Building	1,200,000	920,000
Accumulated Depreciation, Building	(240,000)	(160,000)
Equipment	480,000	480,000
Accumulated Depreciation, Equipment	(116,000)	(56,000)
Intangible Assets	20,000	40,000
Total Assets	<u>\$4,136,400</u>	<u>\$3,876,400</u>
Liabilities and Stockholders' Equity		
Accounts Payable	\$ 470,800	\$ 660,800
Notes Payable (current)	40,000	160,000
Accrued Liabilities	10,800	20,800
Mortgage Payable	1,080,000	800,000
Bonds Payable	1,000,000	760,000
Common Stock	1,200,000	1,200,000
Paid-in Capital in Excess of Par Value	80,000	80,000
Retained Earnings	254,800	194,800
Total Liabilities and Stockholders' Equity	<u>\$4,136,400</u>	<u>\$3,876,400</u>

- P 4.** Use the information for Karidis Ceramics, Inc., given in P 3, to complete the following requirements.

LO 4 The Work Sheet and the
LO 7 Statement of Cash Flows:
SO 8 Indirect Method

REQUIRED



1. Prepare a work sheet for the statement of cash flows for Karidis Ceramics, Inc.
2. Answer requirements 1, 2, and 3 in P 3 if that problem was not assigned.

- P 5.** The income statement for Tanucci Clothing Store is at the top of the next page. The following is additional information: (a) other sales and administrative expenses include depreciation expense of \$104,000 and amortization expense of \$36,000; (b) accrued liabilities for salaries were \$24,000 less than the previous year, and prepaid expenses were \$40,000 more than the previous year; and (c) during the year accounts receivable (net) increased by \$288,000, accounts payable increased by \$228,000, and income taxes payable decreased by \$14,400.

SO 9 Cash Flows from Operating
Activities: Direct Method



REQUIRED

Using the direct method, prepare a schedule of cash flows from operating activities as illustrated in Exhibit 6.

Tanucci Clothing Store
Income Statement
For the Year Ended June 30, 20xx

Net Sales		\$4,900,000
Cost of Goods Sold		
Beginning Inventory	\$1,240,000	
Net Cost of Purchases	3,040,000	
Goods Available for Sale	\$4,280,000	
Ending Inventory	1,400,000	
Cost of Goods Sold		2,880,000
Gross Margin		\$2,020,000
Operating Expenses		
Sales and Administrative Salaries Expense	\$1,112,000	
Other Sales and Administrative Expenses	624,000	
Total Operating Expenses		1,736,000
Income Before Income Taxes		\$ 284,000
Income Taxes		78,000
Net Income		\$ 206,000

LO 4 The Statement of Cash
LO 7 Flows: Indirect Method

- P 6.** O'Brien Corporation's comparative balance sheets as of December 31, 20x2 and 20x1, and its income statement for the year ended December 31, 20x2, follow.

O'Brien Corporation
Comparative Balance Sheets
December 31, 20x2 and 20x1

	20x2	20x1
Assets		
Cash	\$ 82,400	\$ 25,000
Accounts Receivable (net)	82,600	100,000
Inventory	175,000	225,000
Prepaid Rent	1,000	1,500
Furniture and Fixtures	74,000	72,000
Accumulated Depreciation, Furniture and Fixtures	(21,000)	(12,000)
Total Assets	\$394,000	\$411,500
Liabilities and Stockholders' Equity		
Accounts Payable	\$ 71,700	\$100,200
Income Taxes Payable	700	2,200
Notes Payable (long-term)	20,000	10,000
Bonds Payable	50,000	100,000
Common Stock, \$10 par value	120,000	100,000
Paid-in Capital in Excess of Par Value	90,720	60,720
Retained Earnings	40,880	38,380
Total Liabilities and Stockholders' Equity	\$394,000	\$411,500

O'Brien Corporation
Income Statement
For the Year Ended December 31, 20x2

Net Sales		\$804,500
Cost of Goods Sold		<u>563,900</u>
Gross Margin		\$240,600
Operating Expenses (including Depreciation Expense of \$23,400)		<u>224,700</u>
Income from Operations		\$ 15,900
Other Income (Expenses)		
Gain on Disposal of Furniture and Fixtures	\$ 3,500	
Interest Expense	<u>(11,600)</u>	<u>(8,100)</u>
Income Before Income Taxes		\$ 7,800
Income Taxes		<u>2,300</u>
Net Income		<u><u>\$ 5,500</u></u>

The following is additional information about 20x2: (a) furniture and fixtures that cost \$17,800 with accumulated depreciation of \$14,400 were sold at a gain of \$3,500; (b) furniture and fixtures were purchased in the amount of \$19,800; (c) a \$10,000 note payable was paid and \$20,000 was borrowed on a new note; (d) bonds payable in the amount of \$50,000 were converted into 2,000 shares of common stock; and (e) \$3,000 in cash dividends were declared and paid.

REQUIRED

1. Using the indirect method, prepare a statement of cash flows. Include a supporting schedule of noncash investing and financing transactions. (Do not use a work sheet.)
2. What are the primary reasons for O'Brien Corporation's large increase in cash from 20x1 to 20x2, despite its low net income?
3. Compute and assess cash flow yield and free cash flow for 20x2.

ALTERNATE PROBLEMS

LO 1 Classification of LO 3 Transactions

- P 7.** Analyze each transaction below and place X's in the appropriate columns to indicate its classification and its effect on cash flows using the indirect method.

Transaction	Cash Flow Classification				Effect on Cash		
	Operating Activity	Investing Activity	Financing Activity	Noncash Transaction	Increase	Decrease	No Effect
1. Earned a net income.							
2. Declared and paid cash dividend.							
3. Issued stock for cash.							
4. Retired long-term debt by issuing stock.							
5. Paid accounts payable.							
6. Purchased inventory with cash.							
7. Purchased a one-year insurance policy with cash.							
8. Purchased a long-term investment with cash.							
9. Sold trading securities at a gain.							
10. Sold a machine at a loss.							
11. Retired fully depreciated equipment.							
12. Paid interest on debt.							
13. Purchased available-for-sale securities (long-term).							
14. Received dividend income.							
15. Received cash on account.							
16. Converted bonds to common stock.							
17. Purchased 90-day Treasury bill.							

LO 4 Statement of Cash Flows: SO 9 Direct Method

- P 8.** Flanders Corporation's 20x2 income statement and its comparative balance sheets as of June 30, 20x2 and 20x1, appear on the next page. The following is additional information about 20x2: (a) equipment that cost \$48,000 with accumulated depreciation of \$34,000 was sold at a loss of \$8,000; (b) land and building were purchased in the amount of \$200,000 through an increase of \$200,000 in the mortgage payable; (c) a \$40,000 payment was made on the mortgage; (d) the notes were repaid, but the company borrowed an additional \$60,000 through the issuance of a new note payable; and (e) a \$120,000 cash dividend was declared and paid.

REQUIRED

- Use the direct method to prepare a statement of cash flows. Include a supporting schedule of noncash investing and financing transactions. Do not use a work sheet, and do not include a reconciliation of net income to net cash flows from operating activities.
- What are the primary reasons for Flanders Corporation's large increase in cash from 20x1 to 20x2?
- Compute and assess cash flow yield and free cash flow for 20x2.

Flanders Corporation
Income Statement
For the Year Ended June 30, 20x2

Sales	\$2,081,800
Cost of Goods Sold	<u>1,312,600</u>
Gross Margin	\$ 769,200
Operating Expenses (including Depreciation Expense of \$120,000)	<u>378,400</u>
Income from Operations	\$ 390,800
Other Income (Expenses)	
Loss on Disposal of Equipment	(\$ 8,000)
Interest Expense	<u>(75,200)</u>
	(83,200)
Income Before Income Taxes	\$ 307,600
Income Taxes	<u>68,400</u>
Net Income	<u><u>\$ 239,200</u></u>

Flanders Corporation
Comparative Balance Sheets
June 30, 20x2 and 20x1

	20x2	20x1
Assets		
Cash	\$ 334,000	\$ 40,000
Accounts Receivable (net)	200,000	240,000
Inventory	360,000	440,000
Prepaid Expenses	1,200	2,000
Property, Plant, and Equipment	1,256,000	1,104,000
Accumulated Depreciation, Property, Plant, and Equipment	<u>(366,000)</u>	<u>(280,000)</u>
Total Assets	<u><u>\$1,785,200</u></u>	<u><u>\$1,546,000</u></u>
Liabilities and Stockholders' Equity		
Accounts Payable	\$ 128,000	\$ 84,000
Notes Payable (due in 90 days)	60,000	160,000
Income Taxes Payable	52,000	36,000
Mortgage Payable	720,000	560,000
Common Stock, \$5 par value	400,000	400,000
Retained Earnings	<u>425,200</u>	<u>306,000</u>
Total Liabilities and Stockholders' Equity	<u><u>\$1,785,200</u></u>	<u><u>\$1,546,000</u></u>

- P 9.** Use the information for O'Brien Corporation given in P 6 to answer the following requirements.

LO 4 The Work Sheet and the
LO 7 Statement of Cash Flows:
LO 8 Indirect Method

REQUIRED

1. Prepare a work sheet to gather information for the preparation of the statement of cash flows.
2. Answer requirements 1, 2, and 3 in P 6 if that problem was not assigned.



EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

LO 5 Direct Versus Indirect SD 9 Method



- SD 1.** *Collins Industries, Inc.*, a manufacturing company, uses the direct method of presenting cash flows from operating activities in its statement of cash flows. As noted in the text, most companies use the indirect method.¹⁰

Explain the difference between the direct and indirect methods of presenting cash flows from operating activities. Then choose either the direct or the indirect method and tell why it is the best way of presenting cash flows from operations. Be prepared to discuss your opinion in class.

Group Activity. Assign in-class groups. Have each group develop a position for either the direct or indirect method of presentation and defend that position in a debate.

Ethical Dilemma

LO 3 Ethics and Cash Flow Classifications



- SD 2.** *Chemical Waste Treatment, Inc.*, is a fast-growing company that disposes of chemical wastes. The company has an \$800,000 line of credit at its bank. One section in the loan agreement says that the ratio of cash flows from operations to interest expense must exceed 3.0. If this ratio falls below 3.0, the company must reduce the balance outstanding on its line of credit to one-half the total line if the funds borrowed against the line of credit exceed that amount.

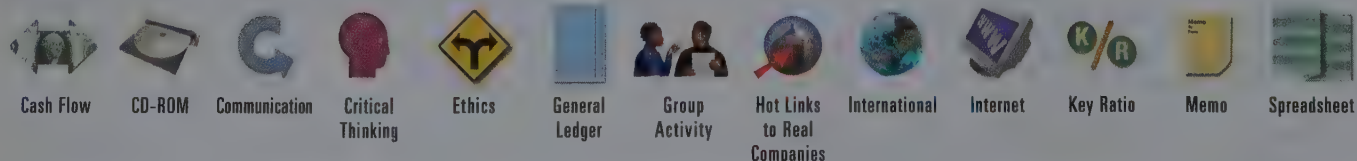
After the end of the fiscal year, the controller informs the president: "We will not meet the ratio requirements on our line of credit in 20x2 because interest expense was \$1.2 million and cash flows from operations were \$3.2 million. Also, we have borrowed 100 percent of our line of credit. We do not have the cash to reduce the credit line by \$400,000." The president says, "This is a serious situation. To pay our ongoing bills, we need our bank to increase our line of credit, not decrease it. What can we do?" "Do you recall the \$500,000 two-year note payable for equipment?" replied the controller. "It is now classified as 'Proceeds from Notes Payable' in cash flows provided from financing activities in the statement of cash flows. If we move it to cash flows from operations and call it 'Increase in Payables,' it would increase cash flows from operations to \$3.7 million and put us over the limit." "Well, do it," ordered the president. "It surely doesn't make any difference where it is on the statement. It is an increase in both places. It would be much worse for our company in the long term if we failed to meet this ratio requirement."

What is your opinion of the president's reasoning? Is the president's order ethical? Who benefits and who is harmed if the controller follows the president's order? What are management's alternatives? What would you do?

Research Activity

LO 3 Basic Research Skills LO 4

- SD 3.** Select the annual reports of three corporations, using one or more of the following sources: your library or the Fingraph® Financial Analyst™ CD-ROM software that





accompanies this text. You may choose them from the same industry or at random, at the direction of your instructor. (If you did a related exercise in a previous chapter, use the same three companies.) Prepare a table with a column for each corporation. Then, for any year covered by the statement of cash flows, answer the following questions: Does the company use the direct or the indirect approach? Is net income more or less than net cash flows from operating activities? What are the major causes of differences between net income and net cash flows from operating activities? Compute cash flow efficiency ratios and free cash flow. Does the dividend appear secure? Did the company make significant capital expenditures during the year? How were the expenditures financed? Do you notice anything unusual about the investing and financing activities of your companies? Do the investing and financing activities provide any insights into management's plan for each company? If so, what are they? Be prepared to discuss your findings in class.

Decision-Making Practice

SD 4.

May Hashimi, president of *Hashimi Print Gallery, Inc.*, is examining the following income statement, which has just been handed to her by her accountant, Lou Klein, CPA.

LO 4 Analysis of Cash Flow
LO 7 Difficulty



Hashimi Print Gallery, Inc. Income Statement For the Year Ended December 31, 20x2

Net Sales	\$884,000
Cost of Goods Sold	508,000
Gross Margin	\$376,000
Operating Expenses (including Depreciation Expense of \$20,000)	204,000
Operating Income	\$172,000
Interest Expense	24,000
Income Before Income Taxes	\$148,000
Income Taxes	28,000
Net Income	\$120,000

After looking at the statement, Hashimi said to Klein, "Lou, the statement seems to be well done, but what I need to know is why I don't have enough cash to pay my bills this month. You show that I earned \$120,000 in 20x2, but I have only \$24,000 in the bank. I know I bought a building on a mortgage and paid a cash dividend of \$48,000, but what else is going on?" Klein replied, "To answer your question, we have to look at comparative balance sheets and prepare another type of statement. Take a look at these balance sheets." The statement handed to Hashimi is on the next page.

1. To what statement is Klein referring? From the information given, prepare the additional statement using the indirect method.
2. Hashimi Print Gallery, Inc., has a cash problem despite profitable operations. Why?

Hashimi Print Gallery, Inc.
Comparative Balance Sheets
December 31, 20x2 and 20x1

	20x2	20x1
Assets		
Cash	\$ 24,000	\$ 40,000
Accounts Receivable (net)	178,000	146,000
Inventory	240,000	180,000
Prepaid Expenses	10,000	14,000
Building	400,000	—
Accumulated Depreciation	(20,000)	—
Total Assets	<u>\$832,000</u>	<u>\$380,000</u>
Liabilities and Stockholders' Equity		
Accounts Payable	\$ 74,000	\$ 96,000
Income Taxes Payable	6,000	4,000
Mortgage Payable	400,000	—
Common Stock	200,000	200,000
Retained Earnings	152,000	80,000
Total Liabilities and Stockholders' Equity	<u>\$832,000</u>	<u>\$380,000</u>

FINANCIAL REPORTING AND ANALYSIS

Interpreting Financial Reports

LO 4 Cash-Generating Efficiency and Free Cash Flow



FRA 1.

The statement of cash flows for *Tandy Corporation*, the owner of Radio Shack and other retail store chains, appears on the next page. For the two years shown, compute the cash-generating efficiency ratios of cash flow yield, cash flows to sales, and cash flows to assets. Also compute free cash flow for the two years. Assume that you report to an investment analyst who has asked you to analyze Tandy's statement of cash flows for 1998 and 1999. Prepare a memorandum to the investment analyst that assesses Tandy's cash-generating efficiency and evaluates its available free cash flow in light of its financing activities. Are there any special operating circumstances that should be taken into consideration? Refer to your computations and to Tandy's Statement of Cash Flows as attachments. The following data come from Tandy's annual report (in thousands):¹¹

	1999	1998	1997
Net Sales	\$4,126.2	\$4,787.9	\$5,372.2
Total Assets	2,142.0	1,993.6	2,317.5

Tandy Corporation
Statement of Cash Flows
For the Years Ended December 31, 1999 and 1998

(In millions)	1999	1998
Cash flows from operating activities:		
Net income (loss)	\$297.9	\$ 61.3
Adjustments to reconcile net income (loss) to net cash provided by operating activities:		
Restricted stock awards	9.6	82.6
Provision for loss on sale of Computer City	—	108.2
Depreciation and amortization	90.2	99.0
Deferred income taxes and other items	49.0	(4.0)
Provision for credit losses and bad debts	9.9	12.5
Changes in operating assets and liabilities:		
Receivables	(38.3)	(36.7)
Inventories	52.6	85.6
Other current assets	15.1	17.7
Accounts payable, accrued expenses and income taxes	75.6	(11.4)
Net cash provided by operating activities	<u>561.6</u>	<u>414.8</u>
Investing activities:		
Additions to property, plant and equipment	(102.4)	(131.5)
Proceeds from sale of property, plant and equipment	5.6	6.7
Proceeds from sale of Computer City	—	36.5
Investment in North Point Communication	(20.0)	—
Other investing activities	(4.2)	(4.7)
Net cash used by investing activities	<u>(121.0)</u>	<u>(93.0)</u>
Financing activities:		
Purchases of treasury stock	(422.2)	(337.4)
Proceeds from sale of common stock put options	4.4	0.3
Sale of treasury stock to employee stock plans	39.5	35.4
Proceeds from exercise of stock options	42.0	22.4
Dividends paid	(42.5)	(44.8)
Changes in short-term borrowings, net	(42.3)	(44.9)
Additions to long-term borrowings	100.6	45.7
Repayments of long-term borrowings	(20.0)	(39.9)
Net cash used by financing activities	<u>(340.5)</u>	<u>(363.2)</u>
Increase (decrease) in cash and cash equivalents	100.1	(41.4)
Cash and cash equivalents, beginning of period	<u>64.5</u>	<u>105.9</u>
Cash and cash equivalents, end of period	<u><u>\$164.6</u></u>	<u><u>\$ 64.5</u></u>

International Company**FRA 2:**

The following data pertain to two of Japan's most well-known and successful companies¹² (numbers are in billions of yen):

LO 4 Comparison of Cash Flow Generation Ratios

	Sony Corporation		Canon, Inc.	
	1999	1998	1999	1998
Net sales	¥6,415	¥6,425	¥2,622	¥2,826
Net income	179	222	70	110
Average total assets	6,351	6,041	2,658	2,792
Net cash flows from operating activities	663	612	309	247
Dividends	25	22	15	16
Net capital expenditures	340	356	202	194

Calculate the cash flow yield, cash flows to sales, cash flows to assets, and free cash flow for the two years for each company. Which company is most efficient in generating cash flow? Which company has the best year-to-year trend? Which company most likely will need external financing?

Toys "R" Us Annual Report**FRA 3:**

Refer to the statement of cash flows in the Toys "R" Us annual report to answer the following questions:

LO 4 Analysis of the Statement of Cash Flows

1. Does Toys "R" Us use the direct or the indirect method of reporting cash flows from operating activities? Other than net earnings, what are the most important factors affecting cash flows from operating activities? Explain the trend of each.
2. Based on the cash flows from investing activities, would you say that Toys "R" Us is a contracting or an expanding company?
3. Calculate the cash flow yield, cash flows to sales, cash flows to assets, and free cash flow for the last three years for Toys "R" Us. How would you evaluate the company's cash-generating efficiency? Does Toys "R" Us need external financing? If so, where has it come from?

Fingraph® Financial Analyst™**FRA 4:**

Choose any two companies from the same industry in the Fingraph® Financial Analyst™ CD-ROM software.

LO 3 Cash Flow Analysis**LO 4**

1. In the annual reports for the companies you have selected, identify the statement of cash flows. Do the companies use the direct or indirect form of the statement?
2. Display and print in tabular and graphical form the Statement of Cash Flows: Operating Activities Analysis page. Prepare a table that compares the cash flow yield, cash flows to sales, and cash flows to assets for both companies for two years. Are the ratios moving in the same or opposite directions? Study the operating activities sections of the statements to determine the main causes of differences between the net income and cash flows from operations. How do the companies compare?
3. Display and print in tabular and graphical form the Statement of Cash Flows: Investing and Financing Activities Analysis page. Prepare a table that compares the free cash flow for both companies for two years. How do the companies compare? Are the companies growing or contracting? Study the investing and financing activities sections of the statements to determine the main causes of differences between the companies.
4. Find and read references to cash flows in the liquidity analysis section of management's discussion and analysis in each annual report.
5. Write a one-page executive summary that reports your findings from parts 1–4, including your assessment of the companies' comparative liquidity. Include the Fingraph® pages and your tables as attachments to your report.

FIA 5:

LO 4 Follow-up Analysis of Cash Flows



Internet Case

Through the Needles Accounting Resource Center at <http://college.hmco.com>, go to the annual report on the web site for **Marriott International, Inc.** Find the financial statements including the statement of cash flows. Compare Marriott's cash flow performance for the most recent year with the 1999 statement at the beginning of this chapter by (1) identifying major changes in operating, investing, and financing activities, (2) reading management's financial review of cash flows, and (3) calculating the cash flow ratios (cash flow yield, cash flows to sales, cash flows to assets, and free cash flow) for the most recent year. Be prepared to discuss your conclusions in class.

ENDNOTES

1. Marriott International, Inc., *Annual Report*, 1999.
2. *Statement of Financial Accounting Standards No. 95*, "Statement of Cash Flows" (Norwalk, Conn.: Financial Accounting Standards Board, 1987).
3. *Statement of Financial Accounting Concepts No. 1*, "Objectives of Financial Reporting for Business Enterprises" (Norwalk, Conn.: Financial Accounting Standards Board, 1978), par. 37–39.
4. Marriott International, Inc., *Annual Report*, 1999.
5. Gary Slutsker, "Look at the Birdie and Say: 'Cash Flow,'" *Forbes*, October 25, 1993.
6. Jonathan Clements, "Yacktman Fund Is Bloodied but Unbowed," *The Wall Street Journal*, November 8, 1993.
7. Jeffrey Laderman, "Earnings, Schmearnings—Look at the Cash," *Business Week*, July 24, 1989.
8. Marriott International, Inc., *Annual Report*, 1999.
9. American Institute of Certified Public Accountants, *Accounting Trends & Techniques* (New York: AICPA, 1999).
10. Ibid.
11. Tandy Corporation, *Annual Report*, 1999.
12. Sony Corporation, *Annual Report*, 1999; and Canon, Inc., *Annual Report*, 1999.

18

Financial Performance Evaluation

LEARNING OBJECTIVES

- 1** Describe and discuss financial performance evaluation by internal and external users.
- 2** Describe and discuss the standards for financial performance evaluation.
- 3** State the sources of information for financial performance evaluation.
- 4** Apply horizontal analysis, trend analysis, and vertical analysis to financial statements.
- 5** Apply ratio analysis to financial statements in a comprehensive evaluation of a company's financial performance.



DECISION POINT: A USER'S FOCUS



Material Sciences Corporation

Material Sciences Corporation (MSC) is a technology-based manufacturer of continuously process-coated and specialty engineered materials and services. It makes such products as coil-plated metal, disc-brake-noise dampers, and industrial films. The company has implemented a strategic plan that focuses on long-term strategies, which include the following:¹

- Use cash flow return on assets as the primary financial and operating measure throughout the company
- Focus on asset management, cost control, and the optimization of manufacturing and distribution facilities
- Grow the business through internal growth, partnering, and acquisitions
- Increase value through technology

How does the management of a company like MSC go about implementing such a strategic plan?

To make its strategic plan operational, MSC's management develops key financial performance measures linked to each of its strategies. Each measure should be an indicator of success or failure in meeting one or more of the strategies. This approach motivates and rewards employees for working toward corporate objectives. It provides concrete proof that the company is achieving its objectives and helps coordinate the company's business processes. Customers and potential investors perceive the company as reliable and progressive in meeting its financial targets. When MSC's management reports to stockholders, it emphasizes its annual and long-term success in achieving the key performance measures. For example, financial highlights from a recent annual report included the following:

- Net sales for the year were up 46 percent
- Working capital was reduced by 32.8 percent
- Cash provided by operating activities, net of capital expenditures (free cash flow), was \$52.3 million
- Selling, general, and administrative expenses declined to 12.0 percent from 16.5 percent (of sales)
- Total debt was reduced by \$48.5 million

The measurement and reporting of financial performance is a key component in successfully managing a business. For managers to implement their strategic plans using financial measures of performance, they must understand the comprehensive framework commonly employed by internal and external users to evaluate their company's results. This chapter provides that framework.

Financial Performance Evaluation by Internal and External Users

OBJECTIVE

1 Describe and discuss financial performance evaluation by internal and external users

Financial performance evaluation, also called *financial statement analysis*, comprises all the techniques users of financial statements employ to show important relationships in an organization's financial statements and to relate them to important financial objectives. Users of financial statements who perform financial performance evaluations fall into two categories: internal users and external users. Both groups have a strong interest in financial performance. Internal users include top managers, who set and strive to achieve financial performance objectives, middle-level managers of business processes, and employee stockholders. External users are creditors and investors who want to assess management's accomplishment of financial objectives, as well as customers who form cooperative agreements with the company.

Internal Users

The setting of financial performance objectives is a major function of management's plan to achieve the company's strategic goals. All strategic and operating plans established by management must eventually be stated in terms of financial objectives. One of the primary objectives of management is to increase the wealth of the owners or stockholders of the business, but this objective must be divided into components. The Decision Point listed examples of MSC's performance objectives. A complete financial plan should have balanced financial performance objectives in all of the following categories:

Business Objectives	Links to Financial Performance
Liquidity	Ability to pay bills when due and to meet unexpected needs for cash
Profitability	Ability to earn a satisfactory net income
Long-term solvency	Ability to survive for many years
Cash flow adequacy	Ability to generate sufficient cash through operating, investing, and financing activities
Market strength	Ability to increase the wealth of owners

The main responsibility of management is to put into action and to carry out the plans that are designed to achieve the financial performance objectives. Management must constantly monitor key financial performance measures, determine the cause of any deviations in the measures, and propose corrective actions. Annual measures provide data for long-term trend analysis. Reports should be formatted to highlight key performance measures. Management develops monthly, quarterly, and annual reports that compare actual performance with objectives for key financial measures in each of the above categories.

External Users

Creditors make loans in the form of trade accounts, notes, or bonds. They expect them to be repaid according to specified terms and to receive interest on the notes and bonds payable. Investors buy capital stock, from which they hope to receive dividends and an increase in value. Both groups face risks. The creditor faces the risk that the debtor will fail to pay back the loan. The investor faces the risks that dividends will be reduced or not paid and that the market price of the stock will drop. For both groups, the goal is to achieve a return that makes up for the risk. In general, the greater the risk taken, the greater the return required as compensation.

Any one loan or any one investment can turn out badly. As a result, most creditors and investors put their funds into a **portfolio**, or a group of loans or investments. The portfolio is designed to average both the returns and the risks. Nevertheless, individual decisions about the loans or stock in the portfolio must still be made. It is in making those individual decisions that financial performance evaluation is most useful. Creditors and investors use financial performance evaluation in two general ways: (1) to judge past performance and current position and (2) to judge future potential and the risk connected with that potential.

Assessment of Past Performance and Current Position

Past performance is often a good indicator of future performance. Therefore, an investor or creditor looks at the trends of past sales, expenses, net income, cash flow, and return on investment not only as means of judging management's past performance but also as possible indicators of future performance. In addition, an evaluation of current position will tell, for example, what assets the business owns and what liabilities must be paid. It will also tell what the cash position is, how much debt the company has in relation to equity, and what levels of inventories and receivables exist. Knowing a company's past performance and current position is often important in judging future potential and the related risk.

Assessment of Future Potential and Related Risk

Information about the past and present is useful only to the extent that it bears on decisions about the future. An investor judges the potential earning ability of a company because that ability will affect the market price of the company's stock and the amount of dividends the company will pay. A creditor judges the potential debt-paying ability of the company.

The riskiness of an investment or loan depends on how easy it is to predict future profitability or liquidity. If an investor can predict with confidence that a company's earnings per share will be between \$2.50 and \$2.60 in the next year, the investment is less risky than if the earnings per share are expected to fall between \$2.00 and \$3.00. For example, the potential associated with an investment in an established and stable electric utility, or a loan to it, is relatively easy to predict on the basis of the company's past performance and current position. The potential associated with investment in a small Internet firm, on the other hand, may be much harder to predict. For this reason, the investment in or loan to the electric utility carries less risk than the investment in or loan to the small Internet company.

Often, in return for taking a greater risk, an investor in the Internet company will demand a higher expected return (increase in market price plus dividends) than will an investor in the utility company. Also, a creditor of the Internet company will demand a higher interest rate and possibly more assurance of repayment (a secured loan, for instance) than a creditor of the utility company. The higher interest rate reimburses the creditor for assuming a higher risk.

Standards for Financial Performance Evaluation

OBJECTIVE

2 Describe and discuss the standards for financial performance evaluation

When evaluating financial performance, decision makers must judge whether the relationships they have found are favorable or unfavorable. Three commonly used standards of comparison are (1) rule-of-thumb measures, (2) past performance of the company, and (3) industry norms.

Rule-of-Thumb Measures



Many financial analysts, investors, and lenders employ ideal, or rule-of-thumb, measures for key financial ratios. For example, it has long been thought that a current ratio (current assets divided by current liabilities) of 2:1 is acceptable. The credit-rating firm of Dun & Bradstreet, in its *Industry Norms and Key Business Ratios*, offers such rules of thumb as the following:

Current debt to tangible net worth Ordinarily, a business begins to pile up trouble when this relationship exceeds 80 percent.

Inventory to net working capital Ordinarily, this relationship should not exceed 80 percent.

Although such measures may suggest areas that need further investigation, there is no proof that the specified levels are the best for every company. A company with a current ratio higher than 2:1 may have a poor credit policy (resulting in accounts receivable being too large), too much inventory, or poor cash management. Another company may have a ratio lower than 2:1 as a result of excellent management in all three of those areas. Thus, rule-of-thumb measures must be used with great care.

Past Performance of the Company

An improvement over rule-of-thumb measures is the comparison of a company's financial measures or ratios over a period of time. Such a comparison will give the analyst at least some basis for judging whether a measure or ratio is improving or deteriorating. It may also be helpful in showing future trends. However, because trends reverse at times, such projections must be made with care. Another problem with trend analysis is that the past may not be a useful measure of adequacy. In other words, past performance may not be enough to meet present needs. For example, even if return on total investment improved from 3 percent one year to 4 percent the next, the 4 percent return may in fact not be adequate.

Industry Norms

One way of making up for the limitations of using past performance as a standard is to use industry norms. Such norms tell how a company's performance compares with the average performance of other companies in the same industry. For example, suppose that companies in an industry have an average rate of return on total investment of 8 percent. In such a case, a company whose rate of return is only 3 percent is probably not performing adequately. Industry norms can also be used to judge trends. Suppose that a company's profit margin dropped from 12 to 10 percent because of a downward turn in the economy. If other companies in the same industry experienced an average drop in profit margin from 12 to 4 percent,

that norm would indicate that the first company had done relatively well. Sometimes, instead of industry averages, data for the industry leader or a specific competitor are used for evaluation.

There are three limitations to using industry norms as standards. First, two companies that seem to be in the same industry may not be strictly comparable. For example, consider two companies in the oil industry. One company may be purchasing oil products and then marketing them through service stations. The other, an international company, may discover, produce, refine, and market its own oil products. The operations of these two companies cannot be compared because they are different.

Second, most large companies today operate in more than one industry. Some of these **diversified companies**, or *conglomerates*, operate in many unrelated industries. The individual segments of a diversified company generally have different rates of profitability and different degrees of risk. In evaluating the consolidated financial statements of such companies, it is often impossible to use industry norms as standards. There are simply no other companies that are similar enough. A requirement by the Financial Accounting Standards Board, presented in *Statement No. 131*, provides a partial solution to this problem. It states that diversified companies must report segment profit or loss, certain revenue and expense items, and segment assets for each of their operating segments. Depending on how the company is organized, segment information may be reported for operations in different industries or in different geographical areas or for major customers.²



An example of segment reporting may be found in Exhibit 1. Goodyear Tire & Rubber Co. is a well-known tire company, but it also has significant engineered products and chemical products divisions. The selected data on sales, income, and assets for those segments shown in Exhibit 1 allow the analyst to compute important profitability performance measures, such as profit margin, asset turnover, and return on assets, for each segment and to compare them to their respective industry norm. Note that the tire business is divided into geographic segments and that separate data are reported for each segment.

The third limitation of industry norms is that companies in the same industry with similar operations may use different acceptable accounting procedures. That is, different methods may be used to value inventories, or different methods may be used to depreciate similar assets. Even so, if little information about a company's prior performance is available, industry norms probably offer the best available standards for judging current performance—as long as they are used with care.

Sources of Information

OBJECTIVE

3 State the sources of information for financial performance evaluation

The external analyst is often limited to using publicly available information about a company. The major sources of information about publicly held corporations are reports published by the company, SEC reports, business periodicals, and credit and investment advisory services.

Reports Published by the Company

The annual report of a publicly held corporation is an important source of financial information. The main parts of an annual report are (1) management's analysis of the past year's operations, (2) the financial statements, (3) the notes to the statements, including the principal accounting procedures used by the company, (4) the auditors' report, and (5) the summary of operations for a five- or ten-year period.

EXHIBIT 1**Selected Segment Information
for Goodyear Tire & Rubber Co.**

(In millions)	1999	1998	1997
Sales			
North American Tire	\$ 6,355.3	\$ 6,235.2	\$ 6,207.5
Europe Tire	2,558.6	2,061.0	2,022.5
Eastern Europe, Africa, and Middle East Tire	796.2	850.0	904.7
Latin American Tire	930.8	1,245.6	1,413.4
Asia Tire	575.9	501.8	666.9
Total Tires	11,216.8	10,893.6	11,215.0
Engineered Products	1,210.1	1,279.3	1,324.0
Chemical Products	928.4	970.8	1,089.1
Total Segment Sales	13,355.3	13,143.7	13,628.1
Income			
North American Tire	\$ 19.0	\$ 378.6	\$ 382.5
Europe Tire	188.0	199.7	166.7
Eastern Europe, Africa, and Middle East Tire	49.8	102.4	102.4
Latin American Tire	67.7	186.1	233.5
Asia Tire	26.0	7.5	58.6
Total Tires	350.5	874.3	943.7
Engineered Products	71.0	111.8	130.1
Chemical Products	118.9	139.6	128.3
Total Segment Income (EBIT)	540.4	1,125.7	1,202.1
Assets			
North American Tire	\$ 4,847.7	\$ 3,944.6	\$ 3,596.6
Europe Tire	3,336.1	1,690.0	1,460.4
Eastern Europe, Africa, and Middle East Tire	897.1	898.1	663.0
Latin American Tire	820.7	993.8	979.5
Asia Tire	725.5	744.0	522.3
Total Tires	10,627.1	8,270.5	7,221.8
Engineered Products	673.6	678.9	630.3
Chemical Products	644.5	576.5	541.0
Total Segment Assets	11,945.2	9,525.9	8,393.1

Source: Goodyear Tire & Rubber Co., *Annual Report*, 1999.

Most publicly held companies also publish interim financial statements. An **interim financial statement** reports data for a period of less than one year, usually a quarter or a month. Interim reports present limited information in the form of condensed financial statements, which need not be subjected to a full audit by the independent auditor. The interim statements are watched closely by the financial community for early signs of important changes in a company's earnings trend.

FOCUS ON BUSINESS TECHNOLOGY

Performance reports and other financial information, stock quotes, reference data, and news about companies and markets are available instantaneously to individuals on the Internet through such services as



CompuServe, America Online, Yahoo, and Wall Street Journal Interactive Edition. The Internet is

an international web of computer-driven communications systems that links tens of millions of homes and businesses through telephone, cable, and computer networks. With access to the online services of brokers



like Charles Schwab & Co., Inc., which allow customers to use their own computers to buy and sell stock and other securities, individuals today have resources equivalent to those used by many professional analysts.

SEC Reports

Publicly held corporations must file annual reports, quarterly reports, and current reports with the Securities and Exchange Commission (SEC). All such reports are available to the public at a small charge. The SEC requires companies to submit their annual reports in a standard form (Form 10-K) that contains more information than their published annual reports. For that reason, Form 10-K is a valuable source of information. It is available free of charge to stockholders of the company. The SEC quarterly report (Form 10-Q) presents important facts about interim financial performance. The SEC current report (Form 8-K) must be filed within a few days of the date of certain significant events, such as the sale or purchase of a division of the company or a change in auditors. This report is often the first indicator of important changes that may affect a company's financial performance in the future. Many company reports filed with the Securities and Exchange Commission are now available on the Internet at <http://www.sec.gov/edgarhp.htm>.

Business Periodicals and Credit and Investment Advisory Services

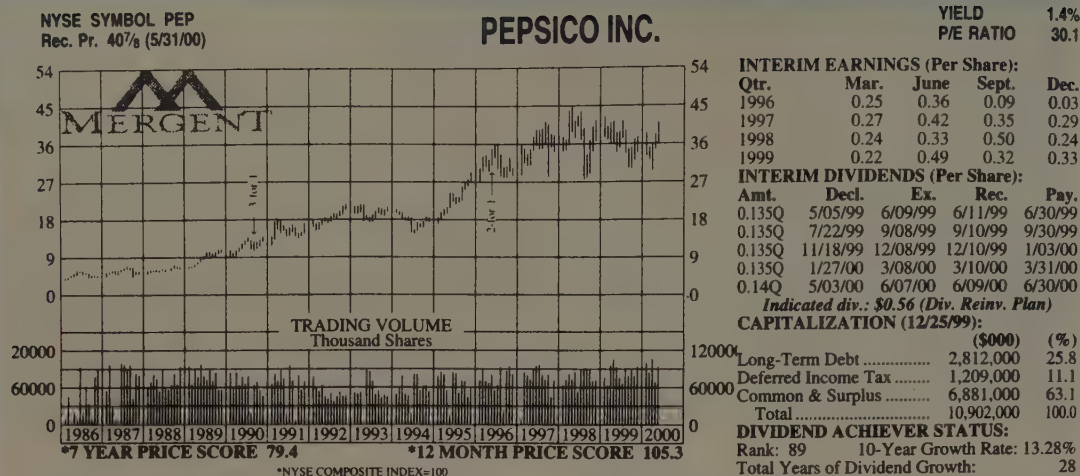
Financial analysts must keep up with current events in the financial world. Probably the best source of financial news is *The Wall Street Journal*, which is published every business day and is the most complete financial newspaper in the United States. Some helpful magazines, published every week or every two weeks, are *Forbes*, *Barron's*, *Fortune*, and the *Financial Times*.

For further details about the financial history of companies, the publications of such services as Moody's Investors Service, Inc., and Standard & Poor's are useful. Data on industry norms, average ratios and relationships, and credit ratings are available from such agencies as The Dun & Bradstreet Corp. In its *Industry Norms and Key Business Ratios*, Dun & Bradstreet offers an annual analysis giving 14 ratios for each of 125 industry groups, classified as retailing, wholesaling, manufacturing, and construction. *Annual Statement Studies*, published by Robert Morris Associates, presents many facts and ratios for 223 different industries. A number of private services are also available for a yearly fee.

An example of specialized financial reporting that is readily available to the public is Mergent's *Handbook of Dividend Achievers*, which profiles companies that have increased their dividends consistently over the past ten years. A sample listing from that publication—for PepsiCo, Inc.—is shown in Exhibit 2. A wealth of information about the company is summarized on one page: the market action of its stock; summaries of its business operations, recent developments, and prospects;



Exhibit 2

Sample Listing from
Mergent's Handbook of
Dividend Achievers

RECENT DEVELOPMENTS: For the year ended 12/25/99, net income rose 2.9% to \$2.05 billion from \$1.99 billion in the previous year. Total net sales decreased 8.9% to \$20.37 billion from \$22.35 billion the year before. Net sales from Pepsi-Cola increased 46.4% to \$4.38 billion, while Frito-Lay group sales climbed 5.8% to \$11.62 billion. Tropicana sales amounted to \$2.25 billion. Operating profit amounted to \$2.81 billion compared to \$2.58 billion a year earlier.

PROSPECTS: Results are benefiting from PEP's strategy of focusing on high-margin, high-return businesses that generate strong cash flow. PEP will be focusing more on its international snack segment going forward. As part of this initiative, PEP plans to expand the Frito-Lay structure from its current two divisions, Frito-Lay North America and Frito-Lay International, by establishing two new companies: Frito-Lay Europe/Middle East/Africa and Frito-Lay Latin America/Asia Pacific/Australia.

BUSINESS

PEPSICO INC. operates on a worldwide basis within the soft drinks, juice and snack-foods businesses. The beverages segment, which accounted for 21% of sales in 1999 (30% of operating profit), manufactures concentrates, and markets PEPSI, PEPSI-COLA, DIET PEPSI, PEPSI ONE, PEPSI MAX, MOUNTAIN DEW, MUG, ALL SPORT, AQUAFINA, MIRINDA, SLICE and allied brands worldwide, and 7-UP internationally. This segment also operates soft drink bottling businesses principally in the United States. The juice segment, 11% (6%), includes Tropicana Products, Inc., which manufactures and sells its products under trademarks such as TROPICANA PURE PREMIUM, and TROPICANA SEA SONS BEST. Snack Foods, 57% (70%), manufactures and markets snack chips through Frito-Lay Inc. Well-known brands include: DORITOS, RUFFLES and LAYS. On 10/6/97, the Company spun off its Restaurant unit. TRICON Global Restaurants.

ANNUAL FINANCIAL DATA

	12/25/99	12/26/98	12/27/97	12/28/96	12/30/95	12/31/94	12/25/93
Earnings Per Share	\$1.37	\$1.31	\$0.95	\$0.72	\$1.00	\$1.11	\$0.98
Cash Flow Per Share	2.06	2.12	1.65	1.79	2.08	2.09	1.97
Tang. Book Val. Per Share	1.47	...	0.72	...	...	...	...
Dividends Per Share	0.53	0.51	0.48	0.43	0.38	0.34	0.29
Dividend Payout %	38.7	38.9	50.5	59.7	38.0	30.6	29.6

INCOME STATEMENT (IN MILLIONS):

Total Revenues	20,367.0	22,348.0	20,917.0	31,645.0	30,421.0	28,472.4	25,020.7
Costs & Expenses	16,452.0	18,530.0	17,149.0	27,380.0	25,694.0	23,694.2	20,670.0
Depreciation & Amort.	1,032.0	1,234.0	1,106.0	1,719.0	1,740.0	1,577.0	1,444.2
Operating Income	2,818.0	2,584.0	2,662.0	2,546.0	2,987.0	3,201.2	2,906.5
Net Interest Inc./Exp.	d245.0	d321.0	d353.0	d499.0	d555.0	d554.6	d484.0
Income Before Income Taxes	3,656.0	2,263.0	2,309.0	2,047.0	2,432.0	2,664.4	2,422.5
Income Taxes	1,606.0	270.0	818.0	898.0	826.0	880.4	668.0
Equity Earnings/Minority Int.	83.0	...	...	...	...	...	...
Net Income	\$2,050.0	\$1,993.0	\$1,491.0	\$1,149.0	\$1,606.0	\$1,784.0	\$1,754.5
Cash Flow	3,082.0	3,227.0	2,597.0	2,868.0	3,346.0	3,361.0	3,198.7
Average Shs. Outstg. (000)	1,496,000	1,519,000	1,570,000	1,606,000	1,608,000	1,607,200	1,620,200

BALANCE SHEET (IN MILLIONS):

Cash & Cash Equivalents	1,056.0	394.0	2,883.0	786.0	1,498.0	1,488.1	1,856.2
Total Current Assets	4,173.0	4,362.0	6,251.0	5,139.0	5,546.0	5,072.2	5,164.1
Net Property	5,266.0	7,318.0	6,261.0	10,191.0	9,870.0	9,882.8	8,855.6
Total Assets	17,551.0	22,660.0	20,101.0	24,512.0	25,432.0	24,792.0	23,705.8
Total Current Liabilities	3,788.0	7,914.0	4,257.0	5,139.0	5,230.0	5,270.4	6,574.9
Long-Term Obligations	2,812.0	4,028.0	4,946.0	8,439.0	8,509.0	8,840.5	7,442.6
Net Stockholders' Equity	6,881.0	6,401.0	6,936.0	6,623.0	7,313.0	6,856.1	6,338.7
Net Working Capital	385.0	d3,552.0	1,994.0	...	316.0	d198.2	d1,410.8
Year-end Shs. Outstg. (000)	1,455,000	1,471,000	1,502,000	1,545,000	1,576,000	1,579,800	1,597,600

STATISTICAL RECORD:

Operating Profit Margin %	13.8	11.6	12.7	8.0	9.8	11.2	11.6
Net Profit Margin %	10.1	8.9	7.1	3.6	5.3	6.3	7.0
Return on Equity %	29.8	31.1	21.5	17.3	22.0	26.0	27.7
Return on Assets %	11.7	8.8	7.4	4.7	6.3	7.2	7.4
Debt/Total Assets %	16.0	17.8	24.6	34.4	33.5	35.7	31.4
Price Range	42 ¹ / ₁₆ -30 ¹ / ₈	44 ¹ / ₁₆ -27 ¹ / ₁₆	41 ¹ / ₁₆ -28 ¹ / ₄	35 ¹ / ₁₆ -27 ¹ / ₄	29 ¹ / ₁₆ -16 ¹ / ₁₆	20 ¹ / ₁₆ -14 ¹ / ₁₆	21 ¹ / ₁₆ -17 ¹ / ₄
P/E Ratio	31.1-22.0	34.2-21.0	43.5-29.7	49.8-37.8	29.4-16.9	18.5-13.2	22.3-17.6
Average Yield %	1.5	1.4	1.4	1.4	1.6	1.9	1.5

Statistics are as originally reported. Adj. for 2-for-1 stk. split, 5/96. Incl. non-recurr. chrgs. \$290.0 million: bef. disc. oper. gain \$651.0 mill. 2 Incl. non-recurr. chrgs. 1/31/96. \$716.0 mill.: non-cash chrg. 12/31/95. \$520.0 mill. 3 Bef. acctg. change chrg. 12/31/94: \$32.0 mill. 4 Incl. one-time chrg. of \$288.0 mill. 5 Incl. one-time chrg. of \$65.0 mill.

OFFICERS:

R. A. Enrico, Chmn., C.E.O.
K. M. von der Heyden, Vice-Chmn.
S. S. Reinemund, Pres., C.O.O.

INVESTOR CONTACT: M. D. Moore, (914) 253-3035

PRINCIPAL OFFICE: 700 Anderson Hill Rd., Purchase, NY 10577-1444

TELEPHONE NUMBER: (914) 253-2000

FAX: (914) 253-2070

WEB: www.pepsico.com

NO. OF EMPLOYEES: 118,000 (approx.)

SHAREHOLDERS: 220,000 (approx.)

ANNUAL MEETING: In May

INCORPORATED: DE. Sep., 1919; reincorp., NC. Dec., 1986

INSTITUTIONAL HOLDINGS:

No. of Institutions: 903
Shares Held: 859,297,794
% Held: 59.0

INDUSTRY: Bottled and canned soft drinks (SIC: 2086)

TRANSFER AGENT(S): BankBoston, N.A., Boston, MA

earnings and dividend data; annual financial data for the past ten years; and other information. The data in those summaries can be used to do many of the trend analyses and calculate the ratios explained in this chapter.

Tools and Techniques of Financial Performance Evaluation

OBJECTIVE

4 Apply horizontal analysis, trend analysis, and vertical analysis to financial statements



Few numbers are very significant when looked at individually. It is their relationship to other numbers or their change from one period to another that is important. The tools of financial performance evaluation are intended to show relationships and changes. Among the more widely used tools are horizontal analysis, trend analysis, vertical analysis, and ratio analysis. We will illustrate these tools with a comprehensive financial evaluation of Sun Microsystems, Inc. Sun Microsystems was formed in 1982 and has emerged as a global leader in network computing. The company developed many of the core networking technologies that today are the basis of the Internet and corporate intranets, including the widely adopted Java technology.

Horizontal Analysis



Generally accepted accounting principles require the presentation of comparative financial statements that give financial information for the current year and the previous year. A common starting point for studying such statements is **horizontal analysis**, which begins with the computation of changes from the previous year to the current year in both dollar amounts and percentages. The percentage change must be computed to relate the size of the change to the size of the dollar amounts involved. A change of \$1 million in sales is not as impressive as a change of \$1 million in net income, because sales is a larger amount than net income.



Exhibits 3 and 4 present the comparative balance sheets and income statements for Sun Microsystems, Inc., with the dollar and percentage changes shown. The percentage change is computed as follows:

$$\text{Percentage Change} = 100 \times \left(\frac{\text{Amount of Change}}{\text{Base Year Amount}} \right)$$

The **base year** in any set of data is always the first year to be considered. For example, when considering data from 1999 and 2000, 1999 is the base year. Between those two years, Sun Microsystems' total current assets increased by \$689 million, from approximately \$6,188 million to \$6,877 million, or by 11.1 percent. This is computed as follows:

$$\text{Percentage Change} = 100 \times \left(\frac{\$689 \text{ million}}{\$6,188 \text{ million}} \right) = 11.1\%$$

An examination of the components of current assets in the comparative balance sheets shows the changes from 1999 to 2000. All current assets categories except short-term investments increased. It is important to consider both the dollar amount of the increase and the percentage increase. For example, cash and cash equivalents increased 67.9 percent compared with an 80.8 percent increase in inventories. However, the dollar increase in cash and cash equivalents is three times the dollar increase in inventories (\$748 million versus \$249 million). There was a corresponding increase in total current liabilities of \$1,511 million, or 46.5 percent. Total assets increased \$5,653 million, or 66.5 percent, which included an

Exhibit 3

Comparative Balance Sheets with Horizontal Analysis



Sun Microsystems, Inc.
Consolidated Balance Sheets
June 30, 2000 and 1999

(In millions, except per share amounts)	2000	1999	Increase (Decrease)	
			Amount	Percentage
Assets				
Current Assets				
Cash and Cash Equivalents	\$ 1,849	\$1,101	\$ 748	67.9
Short-Term Investments	626	1,591	(965)	(60.7)
Accounts Receivable, Net of Allowances of \$534 in 2000 and \$340 in 1999	2,690	2,310	380	16.5
Inventories	557	308	249	80.8
Deferred Tax Assets	673	506	167	33.0
Other Current Assets	482	372	110	29.6
Total Current Assets	\$ 6,877	\$6,188	\$ 689	11.1
Property, Plant and Equipment, Net	\$ 2,095	\$1,614	\$ 481	29.8
Long-Term Investments	4,496	0	4,496	*
Other Assets, Net	684	697	(13)	(1.9)
Total Assets	\$14,152	\$8,499	\$5,653	66.5
Liabilities and Stockholders' Equity				
Current Liabilities				
Short-Term Borrowings	\$ 7	\$ 2	\$ 5	250.0
Accounts Payable	924	756	168	22.2
Accrued Payroll-Related Liabilities	751	520	231	44.4
Accrued Liabilities and Other	1,366	991	375	37.8
Deferred Revenues and Customer Deposits	1,289	576	713	123.8
Income Taxes Payable	422	403	19	4.7
Total Current Liabilities	\$ 4,759	\$3,248	\$1,511	46.5
Deferred Income Taxes	364	192	172	89.6
Long-Term Debt and Other Obligations	1,720	192	1,528	795.8
Stockholders' Equity	7,309	4,867	2,442	50.2
Total Liabilities and Stockholders' Equity	\$14,152	\$8,499	\$5,653	66.5

* Not meaningful.

Source: Sun Microsystems, Inc., *Annual Report*, 2000.

increase of \$4,496 million in long-term investments. Total stockholders' equity increased by \$2,442 million, or 50.2 percent. All of this shows Sun Microsystems to be a rapidly growing company.

The most important findings from the income statements in Exhibit 4 are that net revenues increased by \$3,915 million, or 33.2 percent; operating income increased by \$873 million, or 57.4 percent; and net income increased by \$824 million, or 80.0 percent. These extremely positive results were achieved in part because net revenues grew faster (33.2 percent) than total operating expenses (25.2 percent).

Exhibit 4
Comparative Income Statements with Horizontal Analysis


Sun Microsystems, Inc.
Consolidated Income Statements
For the Years Ended June 30, 2000 and 1999

(In millions, except per share amounts)	2000	1999	Increase (Decrease)	
			Amount	Percentage
Net Revenues	\$15,721	\$11,806	\$3,915	33.2
Costs of Sales	7,549	5,670	1,879	33.1
Gross Margin	\$ 8,172	\$ 6,136	\$2,036	33.2
Operating Expenses:				
Research and Development	1,630	1,280	350	27.3
Selling, General and Administrative	4,137	3,215	922	28.7
Purchased In-Process Research and Development	12	121	(109)	(90.1)
Total Operating Expenses	\$ 5,779	\$ 4,616	\$1,163	25.2
Operating Income	\$ 2,393	\$ 1,520	\$ 873	57.4
Gain on Sale of Investment, Net	208	0	208	*
Interest Income, Net	170	85	85	100.0
Income Before Income Taxes	\$ 2,771	\$ 1,605	\$1,166	72.6
Provision for Income Taxes	917	575	342	59.5
Net Income	\$ 1,854	\$ 1,030	\$ 824	80.0
Net Income per Common Share—Basic	\$ 1.18	\$ 0.67	\$ 0.51	76.1
Net Income per Common Share—Diluted	\$ 1.10	\$ 0.63	\$ 0.47	74.6
Shares Used in the Calculation of the Net Income per Common Share—Basic	1,576	1,544	32	2.1
Shares Used in the Calculation of the Net Income per Common Share—Diluted	1,689	1,641	48	2.9

* Not meaningful.

Source: Sun Microsystems, Inc., *Annual Report*, 2000.

Trend Analysis



A variation of horizontal analysis is **trend analysis**, in which percentage changes are calculated for several successive years instead of for two years. Trend analysis, with its long-run view, is important because it may point to basic changes in the nature of a business. In addition to providing comparative financial statements, most companies present a summary of operations and data about other key indicators for five or more years. Net revenues and operating income from Sun Microsystems' summary of operations, together with a trend analysis, are presented in Exhibit 5.



Trend analysis uses an **index number** to show changes in related items over a period of time. For index numbers, the base year is equal to 100 percent. Other years are measured in relation to that amount. For example, the 2000 index for Sun Microsystems' net revenues was figured as follows (dollar amounts in millions):

$$\text{Index} = 100 \times \left(\frac{\text{Index Year Amount}}{\text{Base Year Amount}} \right) = 100 \times \left(\frac{\$15,721}{\$7,095} \right) = 221.6$$

Exhibit 5
Trend Analysis


Sun Microsystems, Inc. Net Revenues and Operating Income Trend Analysis					
	2000	1999	1998	1997	1996
Dollar Values (in millions)					
Net Revenues	15,721	11,806	9,862	8,661	7,095
Operating Income	2,393	1,520	1,114	1,099	675
Trend Analysis (in percentages)					
Net Revenues	221.6	166.4	139.0	122.1	100.0
Operating Income	354.5	225.2	165.0	162.8	100.0

Source: Sun Microsystems, Inc., *Annual Report*, 2000.

The trend analysis presented in Exhibit 5 clearly shows that operating income has grown faster than net revenues at Sun Microsystems. However, both net revenues and operating income have increased every year. Figure 1 presents these trends in graphic form.

Vertical Analysis


In **vertical analysis**, percentages are used to show the relationship of the different parts to a total in a single statement. The analyst sets a total figure in the statement equal to 100 percent and computes each component's percentage of that total. (The total figure would be total assets or total liabilities and stockholders' equity on the balance sheet, and net revenues or net sales on the income statement.) The resulting statement of percentages is called a **common-size statement**. Common-size balance sheets and common-size income statements for Sun Microsystems are shown in financial statement form in Exhibits 6 and 7 and in pie-chart form in Figures 2 and 3.

Figure 1
Trend Analysis Presented
Graphically for Sun
Microsystems, Inc.

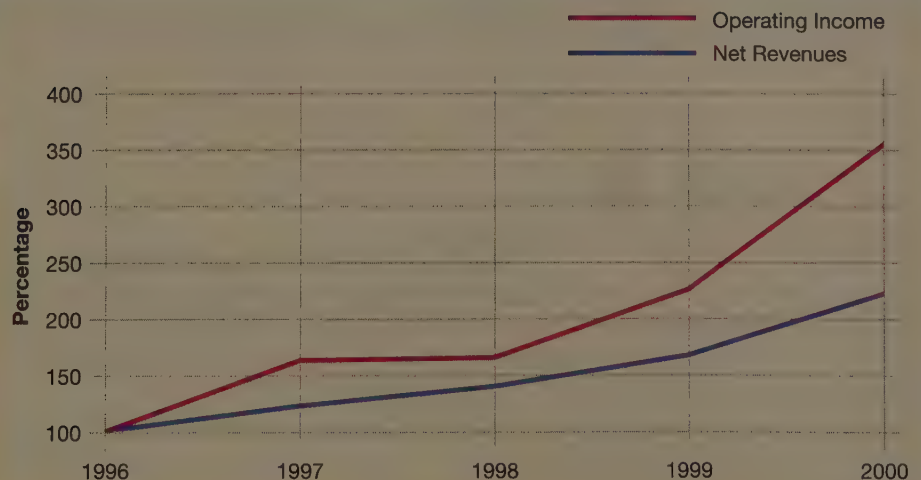


Exhibit 6
Common-Size Balance Sheets

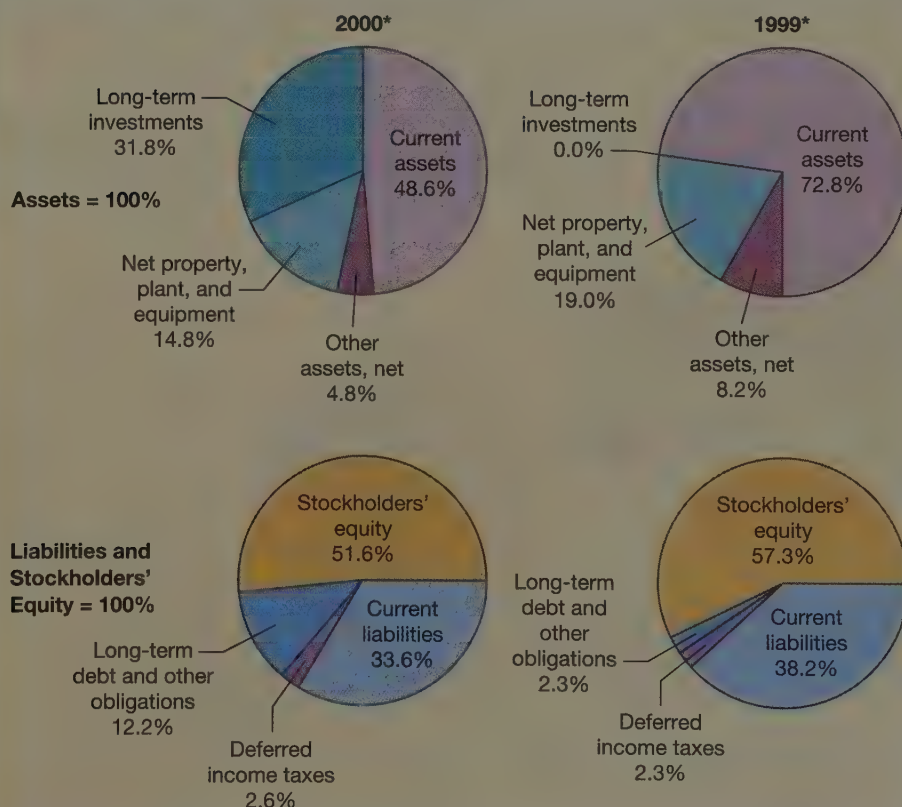
Sun Microsystems, Inc.
Common-Size Balance Sheets
June 30, 2000 and 1999

	2000	1999
Assets		
Current Assets	48.6%	72.8%
Net Property, Plant and Equipment	14.8	19.0
Long-Term Investments	31.8	
Other Assets, Net	4.8	8.2
Total Assets	<u>100.0%</u>	<u>100.0%</u>
Liabilities and Stockholders' Equity		
Current Liabilities	33.6%	38.2%
Deferred Income Taxes	2.6	2.3
Long-Term Debt and Other Obligations	12.2	2.3
Total Liabilities	48.4%	42.7%
Total Stockholders' Equity	51.6	57.3
Total Liabilities and Stockholders' Equity	<u>100.0%</u>	<u>100.0%</u>

Note: Amounts do not precisely total 100 percent in all cases due to rounding.

Source: Sun Microsystems, Inc., *Annual Report*, 2000.

Figure 2
Common-Size Balance Sheets
Presented Graphically for Sun Microsystems, Inc.



* Rounding causes some additions not to total precisely.

Exhibit 7
Common-Size Income Statements


Sun Microsystems, Inc.
Common-Size Income Statements
For the Years Ended June 30, 2000 and 1999

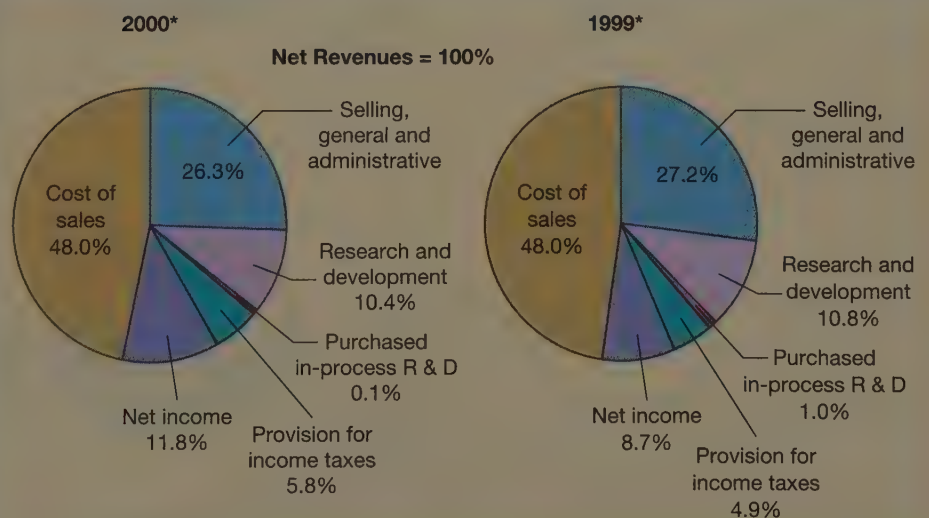
	2000	1999
Net Revenues	100.0%	100.0%
Cost of Sales	48.0	48.0
Gross Margin	52.0%	52.0%
Operating Expenses:		
Research and Development	10.4%	10.8%
Selling, General and Administrative	26.3	27.2
Purchased In-Process R&D	0.1	1.0
Total Operating Expenses	36.8%	39.1%
Operating Income	15.2%	12.9%
Gain on Sale of Investment, Net	1.3	0.0
Interest, Net	1.1	0.7
Income Before Income Taxes	17.6%	13.6%
Provision for Income Taxes	5.8	4.9
Net Income	11.8%	8.7%

Note: Rounding causes some additions and subtractions not to total precisely.

Source: Sun Microsystems, Inc., *Annual Report*, 2000.

Vertical analysis is useful for comparing the importance of specific components in the operation of a business. Also, comparative common-size statements can be used to identify important changes in the components from one year to the next. As shown in Exhibit 6 and Figure 2, from 1999 to 2000 the composition of Sun Microsystems' assets shifted from current assets toward long-term investments, while current liabilities and stockholders' equity decreased due to new long-term

Figure 3
Common-Size Income Statements
Presented Graphically for Sun
Microsystems, Inc.



*Rounding causes some additions not to total precisely.

Note: Interest and gains are not presented.

debt. The main conclusions to be drawn from this analysis are that current assets and current liabilities make up a large portion of Sun Microsystems' financial structure and that until 2000 the company had few long-term liabilities.

The common-size income statements in Exhibit 7, illustrated in Figure 3, show that from 1999 to 2000 Sun Microsystems reduced its operating expenses by 2.3 percent of revenues ($39.1\% - 36.8\%$). This reduction contributed to an increase in operating income as a percentage of net revenues of 2.3 percent ($15.2\% - 12.9\%$).

Common-size statements are often used to make comparisons between companies. They allow an analyst to compare the operating and financing characteristics of two companies of different size in the same industry. For example, the analyst might want to compare Sun Microsystems with other companies in terms of percentage of total assets financed by debt or in terms of selling, general, and administrative expenses as a percentage of net revenues. Common-size statements would show those and other relationships.

Ratio Analysis



Ratio analysis is a technique of financial performance evaluation that identifies meaningful relationships between the components of the financial statements. To be most meaningful, the interpretation of ratios must include a study of the underlying data. Ratios are useful in evaluating a company's financial position and operations and in comparing financial data for several years or for several companies. The primary purpose of ratios is to point out areas needing further investigation. To interpret ratios correctly, an analyst must have a general understanding of the company and its environment. Ratios may be expressed in several ways. For example, a ratio of net income of \$100,000 to sales of \$1,000,000 may be stated as (1) net income is $1/10$ or 10 percent of sales; (2) the ratio of sales to net income is 10 to 1 ($10:1$), or sales are 10 times net income; or (3) for every dollar of sales, the company has an average net income of 10 cents.

Comprehensive Illustration of Ratio Analysis

OBJECTIVE

5 Apply ratio analysis to financial statements in a comprehensive evaluation of a company's financial performance



The financial condition and operating results of any company can be evaluated through the use of comprehensive ratio analysis. Sun Microsystems' performance as reported in its annual report can be compared for the years 1999 and 2000 with regard to the following objectives: (1) liquidity, (2) profitability, (3) long-term solvency, (4) cash flow adequacy, and (5) market strength. Most data for the analyses come from the financial statements presented in Exhibits 3 and 4. Other data are presented as needed.

Evaluating Liquidity



Liquidity is a company's ability to pay bills when they are due and to meet unexpected needs for cash. All the ratios that relate to liquidity involve working capital or some part of it, because debts are paid out of working capital. Liquidity is also closely related to the cash flow ratios.



The liquidity ratios from 1999 to 2000 for Sun Microsystems are presented in Exhibit 8. The **current ratio** and the **quick ratio** are measures of short-term debt-paying ability. The principal difference between the two is that the numerator of the current ratio includes inventories and prepaid expenses. Inventories take longer to convert to cash than do the assets included in the numerator of the quick ratio.

Exhibit 8

Liquidity Ratios of Sun Microsystems, Inc.



(Dollar amounts in millions)	2000	1999
Current ratio: Measure of short-term debt-paying ability		
$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	$\frac{\$6,877}{\$4,759} = 1.4 \text{ times}$	$\frac{\$6,188}{\$3,248} = 1.9 \text{ times}$
Quick ratio: Measure of short-term debt-paying ability		
$\frac{\text{Cash} + \text{Marketable Securities} + \text{Receivables}}{\text{Current Liabilities}}$	$\frac{\$1,849 + \$626 + \$2,690}{\$4,759} = \frac{\$5,165}{\$4,759} = 1.1 \text{ times}$	$\frac{\$1,101 + \$1,591 + \$2,310}{\$3,248} = \frac{\$5,002}{\$3,248} = 1.5 \text{ times}$
Receivables turnover: Measure of relative size of accounts receivable and effectiveness of credit policies		
$\frac{\text{Net Sales}}{\text{Average Accounts Receivable}^*}$	$\frac{\$15,721}{(\$2,690 + \$2,310) \div 2} = \frac{\$15,721}{\$2,500} = 6.3 \text{ times}$	$\frac{\$11,806}{(\$2,310 + \$1,846) \div 2} = \frac{\$11,806}{\$2,078} = 5.7 \text{ times}$
Average days' sales uncollected: Measure of average days taken to collect receivables		
$\frac{\text{Days in Year}}{\text{Receivable Turnover}}$	$\frac{365 \text{ days}}{6.3 \text{ times}} = 57.9 \text{ days}$	$\frac{365 \text{ days}}{5.7 \text{ times}} = 64.0 \text{ days}$
Inventory turnover: Measure of relative size of inventory		
$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}^*}$	$\frac{\$7,549}{(\$557 + \$308) \div 2} = \frac{\$7,549}{\$433} = 17.4 \text{ times}$	$\frac{\$5,670}{(\$308 + \$346) \div 2} = \frac{\$5,670}{\$327} = 17.3 \text{ times}$
Average days' inventory on hand: Measure of average days taken to sell inventory		
$\frac{\text{Days in Year}}{\text{Inventory Turnover}}$	$\frac{365 \text{ days}}{17.4 \text{ times}} = 21.0 \text{ days}$	$\frac{365 \text{ days}}{17.3 \text{ times}} = 21.1 \text{ days}$
Payables turnover: Measure of relative size of accounts payable		
$\frac{\text{Cost of Goods Sold} + / - \text{Change in Inventory}^*}{\text{Average Accounts Payable}^*}$	$\frac{\$7,549 + \$249}{(\$924 + \$756) \div 2} = \frac{7,798}{840} = 9.3 \text{ times}$	$\frac{\$5,670 - \$38}{(\$756 + \$496) \div 2} = \frac{5,632}{626} = 9.0 \text{ times}$
Average days' payable: Measure of average days taken to pay accounts payable		
$\frac{\text{Days in Year}}{\text{Payables Turnover}}$	$\frac{365 \text{ days}}{9.3 \text{ times}} = 39.3 \text{ days}$	$\frac{365 \text{ days}}{9.0 \text{ times}} = 40.6 \text{ days}$

*1998 figures are from Sun Microsystems' 1999 annual report.

Source: Sun Microsystems, Inc., *Annual Report*, 2000.

At Sun Microsystems, both ratios decreased from 1999 to 2000. The current ratio was 1.9 times in 1999 and 1.4 times in 2000, and the quick ratio was 1.5 times in 1999 and 1.1 in 2000. The primary reason for the decreasing results is that current liabilities grew at a faster rate than current assets.



Analysis of two major components of current assets, receivables and inventory, shows improving trends. The major change in this category of ratios is in the receivable turnover. The relative size of accounts receivable and the effectiveness of credit policies are measured by the **receivable turnover**, which rose from 5.7 times in 1999 to 6.3 times in 2000. The related ratio of **average days' sales uncollected** decreased by about six days, from 64.0 days in 1999 to 57.9 days in 2000. The **inventory turnover**, which measures the relative size of inventories, remained stable. Inventory turnover increased from 17.3 times in 1999 to 17.4 times in 2000. This results in a stable **average days' inventory on hand** of 21.1 days in 1999 and 21 days in 2000.

Average days' sales uncollected is added to average days' inventory on hand to determine the **operating cycle**, the time it takes to sell products and collect for them. At Sun Microsystems, the operating cycle decreased from 85.1 days in 1999 (64.0 days + 21.1 days) to 78.9 days in 2000 (57.9 days + 21.0 days). Related to the operating cycle is the number of days the company takes to pay its accounts payable. The **payables turnover** increased from 9.0 times in 1999 to 9.3 times in 2000. This results in average days' payable of 40.6 days in 1999 and 39.3 days in 2000. Thus, if the **average days' payable** is subtracted from the operating cycle, the days of financing required fall from 44.5 days in 1999 to 39.6 days in 2000, a significant improvement. Overall, Sun Microsystems' liquidity remains strong.

Evaluating Profitability



Profitability reflects a company's ability to earn a satisfactory income so that investors and stockholders will continue to provide capital to the company. Profitability is also closely linked to liquidity because earnings ultimately produce cash flow. For this reason, evaluating profitability is important to both investors and creditors. The profitability ratios of Sun Microsystems, Inc., are shown in Exhibit 9.

From 1999 to 2000, **profit margin**, which measures the net income produced by each dollar of sales, increased from 8.7 to 11.8 percent, and **asset turnover**, which measures how efficiently assets are used to produce sales, decreased from 1.7 to 1.4 times. The result is an increase in overall earning power of the company, or **return on assets**, from 14.5 percent in 1999 to 16.4 percent in 2000. These relationships are illustrated in the computations that follow.

FOCUS ON BUSINESS PRACTICE

Efforts to link managers' compensation to the company's performance measures and to the creation of shareholder wealth are increasing. One such measure compares the return on assets to the company's cost of

debt and equity capital. If the return on assets exceeds the cost of financing the assets with debt and equity, then management is indeed creating value for the shareholders. ☞ Coca-Cola calls this excess **economic profit**. In 1998 Coca-Cola reported economic profits of \$2.48 billion, with its stock price tracking the growth and decline of these economic profits.



Exhibit 9

Profitability Ratios of Sun Microsystems, Inc.



(Dollar amounts in millions)	2000	1999
Profit margin: Measure of net income produced by each dollar of sales		
$\frac{\text{Net Income}^*}{\text{Net Sales}}$	$\frac{\$1,854}{\$15,721} = 11.8\%$	$\frac{\$1,030}{\$11,806} = 8.7\%$
Asset turnover: Measure of how efficiently assets are used to produce sales		
$\frac{\text{Net Sales}}{\text{Average Total Assets}^\dagger}$	$\frac{\$15,721}{(\$14,152 + \$8,499) \div 2}$ $= \frac{\$15,721}{\$11,326} = 1.4 \text{ times}$	$\frac{\$11,806}{(\$8,499 + \$5,711) \div 2}$ $= \frac{\$11,806}{\$7,105} = 1.7 \text{ times}$
Return on assets: Measure of overall earning power, or profitability		
$\frac{\text{Net Income}}{\text{Average Total Assets}^\dagger}$	$\frac{\$1,854}{\$11,326} = 16.4\%$	$\frac{\$1,030}{\$7,105} = 14.5\%$
Return on equity: Measure of the profitability of stockholders' investments		
$\frac{\text{Net Income}}{\text{Average Stockholders' Equity}^\dagger}$	$\frac{\$1,854}{(\$7,309 + \$4,867) \div 2}$ $= \frac{\$1,854}{\$6,088} = 30.5\%$	$\frac{\$1,030}{(\$4,867 + \$3,514) \div 2}$ $= \frac{\$1,030}{\$4,191} = 24.6\%$

*In comparing companies in an industry, some analysts use income before income taxes as the numerator to eliminate the effect of differing tax rates among firms.

†1998 figures are from Sun Microsystems' 1999 annual report.

Source: Sun Microsystems, Inc., *Annual Report*, 2000.

Profit Margin		Asset Turnover		Return on Assets	
$\frac{\text{Net Income}}{\text{Net Sales}}$	\times	$\frac{\text{Net Sales}}{\text{Average Total Assets}}$	$=$	$\frac{\text{Net Income}}{\text{Average Total Assets}}$	
2000 11.8%	\times	1.4	$=$	16.5%	
1999 8.7%	\times	1.7	$=$	14.8%	

The small difference in the two sets of return on assets figures results from the rounding of the ratios used in the above computation. Finally, the profitability of stockholders' investments, or **return on equity**, was also higher at 24.6 percent in 1999 and 30.5 percent in 2000.

Evaluating Long-Term Solvency



Long-term solvency has to do with a company's ability to survive for many years. Investors and creditors evaluate long-term solvency ratios to detect early signs that a company is headed for financial difficulty. Studies have indicated that accounting ratios can show as much as five years in advance that a company may fail.³ Declining profitability and liquidity ratios are key indicators of possible business failure. Two other ratios that analysts often consider when assessing long-term solvency are debt to equity and interest coverage. Long-term solvency ratios are shown in Exhibit 10.

Exhibit 10

Long-Term Solvency Ratios of Sun Microsystems, Inc.



(Dollar amounts in millions)	2000	1999
Debt to equity ratio: Measure of capital structure and leverage		
$\frac{\text{Total Liabilities}}{\text{Stockholders' Equity}}$	$\frac{\$6,843}{\$7,309} = .9 \text{ times}$	$\frac{\$3,632}{\$4,867} = .7 \text{ times}$
Interest coverage ratio: Measure of creditors' protection from default on interest payments		
$\frac{\text{Income Before Income Taxes} + \text{Interest Expense}}{\text{Interest Expense}}$	$\frac{\$2,771 + \$84}{\$84} = 34.0 \text{ times}$	$\frac{\$1,605 + \$1}{\$1} = 1,606.0 \text{ times}$

Source: Sun Microsystems, Inc., *Annual Report*, 2000.



Increasing amounts of debt in a company's capital structure mean that the company is becoming more heavily leveraged. Increasing debts negatively affect long-term solvency because they represent increasing legal obligations to pay interest periodically and the principal at maturity. Failure to make those payments can result in bankruptcy. The **debt to equity ratio** measures capital structure and leverage by showing the amount of a company's assets provided by creditors in relation to the amount provided by stockholders. Sun Microsystems' debt to equity ratio was only .7 times in 1999 and .9 times in 2000. Recall from Exhibit 3 that the company has little short-term debt and increasing long-term debt, and that it has ample current assets as reflected by its current ratio and quick ratio. All of these factors contribute to long-term solvency. As to the future, "The Company believes the level of financial resources is a significant competitive factor in its industry, and it may choose at any time to raise additional capital through debt or equity financing to strengthen its financial position, facilitate growth, and provide the Company with additional flexibility to take advantage of business opportunities that may arise."⁴

If debt is risky, why have any? The answer is that the level of debt is a matter of balance. Despite its riskiness, debt is a flexible means of financing business operations. Sun Microsystems is using debt to help finance an increase in long-term investments. The interest paid on that debt is deductible for income tax purposes, whereas dividends paid on stock are not. Because debt usually carries a fixed interest charge, the cost of financing can be limited and leverage can be used to advantage. If the company is able to earn a return on assets greater than the cost of interest, it can make an overall profit.* However, the company runs the risk of not earning a return on assets equal to the cost of financing those assets, thereby incurring a loss.

The **interest coverage ratio** measures the degree of protection creditors have from a default on interest payments. Because of its increasing amount of long-term debt, Sun Microsystems' interest coverage ratio declined from 1,606.0 times in 1999 to 34.0 times in 2000. Interest coverage is not a problem for the company despite this decline because interest coverage of 34 is more than adequate.

Evaluating Cash Flow Adequacy



Because cash flows are needed to pay debts when they are due, cash flow measures are closely related to liquidity and long-term solvency. Sun Microsystems' cash

*In addition, there are advantages to being a debtor in periods of inflation because the debt, which is a fixed dollar amount, may be repaid in cheaper dollars.

Exhibit 11**Cash Flow Adequacy Ratios of Sun Microsystems, Inc.**

(Dollar amounts in millions)	2000	1999
Cash flow yield: Measure of the ability to generate operating cash flows in relation to net income		
Net Cash Flows from Operating Activities	$\frac{\$3,754}{\$1,854} = 2.0 \text{ times}$	$\frac{\$2,511}{\$1,030} = 2.4 \text{ times}$
Net Income		
Cash flows to sales: Measure of the ability of sales to generate operating cash flows		
Net Cash Flows from Operating Activities	$\frac{\$3,754}{\$15,721} = 23.9\%$	$\frac{\$2,511}{\$11,806} = 21.3\%$
Net Sales		
Cash flows to assets: Measure of the ability of assets to generate operating cash flows		
Net Cash Flows from Operating Activities	$\frac{\$3,754}{(\$14,152 + \$8,499) \div 2}$	$\frac{\$2,511}{(\$8,499 + \$5,711) \div 2}$
Average Total Assets*	$= \frac{\$3,754}{\$11,326} = 33.1\%$	$= \frac{\$2,511}{\$7,105} = 35.3\%$
Free cash flow: Measure of cash generated or cash deficiency after providing for commitments		
Net Cash Flows from Operating Activities – Dividends – Net Capital Expenditures	$\$3,754 - \$0 - \$982 = \$2,772$	$\$2,511 - \$0 - \$740 = \$1,771$

*The 1998 figure is from Sun Microsystems' 1999 annual report.

Source: Sun Microsystems, Inc., *Annual Report*, 2000.



flow adequacy ratios are presented in Exhibit 11. By most measures, the company's ability to generate positive operating cash flows showed improvement from 1999 to 2000. Key to the improvement was that net cash flows from operating activities had a large increase, from \$2,511 million in 1999 to \$3,754 million in 2000, while net income, net sales, and average total assets increased by lesser amounts. **Cash flow yield**, or the relationship of cash flows from operating activities to net income, decreased from 2.4 to 2.0 times. **Cash flows to sales**, or the ability of sales to generate operating cash flows, increased from 21.3 percent to 23.9 percent. **Cash flows to assets**, or the ability of assets to generate operating cash flows, decreased from 35.3 percent to 33.1 percent.

Free cash flow, the cash generated or the cash deficiency after providing for commitments, also increased and remains very positive, primarily because the increase in capital expenditures was smaller than the increase in net cash flows from operating activities and because the company pays no dividends. Management's comment with regard to cash flows in the future is, "The Company believes that the liquidity provided by existing cash, cash equivalents, and investments along with the borrowing arrangements . . . will provide sufficient capital to meet the Company's capital requirements through fiscal 2001."⁵

Evaluating Market Strength



The market price of a company's stock is of interest to the analyst because it represents what investors as a whole think of the company at a point in time. Market price is the price at which the stock is bought and sold. It provides information about how investors view the potential return and risk of owning the company's

Exhibit 12**Market Strength Ratios of Sun Microsystems, Inc.**

	2000	1999
Price/earnings ratio: Measure of investor confidence in a company		
$\frac{\text{Market Price per Share}^*}{\text{Earnings per Share}}$	$\frac{\$90.9375}{\$1.10} = 82.7 \text{ times}$	$\frac{\$34.4375}{\$0.63} = 54.7 \text{ times}$
Dividends yield: Measure of the current return to an investor in a stock		
$\frac{\text{Dividends per Share}}{\text{Market Price per Share}}$	Sun Microsystems does not pay a dividend.	

*Market price is from Sun Microsystems' annual report.

Source: Sun Microsystems, Inc., *Annual Report*, 2000.



stock. Market price by itself is not very informative, however. Companies differ in number of outstanding shares and amount of underlying earnings and dividends. Thus, market price must be related to earnings by considering the price/earnings ratio and the dividends yield. Those ratios for Sun Microsystems appear in Exhibit 12 and have been computed using the market price for Sun Microsystems' stock at the end of 1999 and 2000.

The **price/earnings (P/E) ratio**, which measures investor confidence in a company, is the ratio of the market price per share to earnings per share. The P/E ratio is useful in comparing the relative values placed on the earnings of different companies and in comparing the value placed on a company's shares in relation to the overall market. A stock with a lower P/E ratio gives an investor more underlying earnings per dollar invested. However, Sun Microsystems' P/E ratio increased from 54.7 times in 1999 to 82.7 times in 2000. Such an increase suggests that investors believe earnings per share will increase in future years. It signals investors' confidence in Sun Microsystems. The **dividends yield** measures a stock's current return to an investor in the form of dividends. Because Sun Microsystems pays no dividend, it may be concluded that investors expect their return from owning the company's stock to come from increases in its market value.

Summary of the Financial Performance Evaluation of Sun Microsystems, Inc.



This ratio analysis clearly shows that Sun Microsystems' financial condition is strong, as measured by its liquidity, long-term solvency, and cash flow adequacy ratios. The company's profitability is excellent and increased from 1999 to 2000, as measured by its profitability ratios. This performance has been rewarded by a higher market price per share.

Chapter Review

REVIEW OF LEARNING OBJECTIVES

1. **Describe and discuss financial performance evaluation by internal and external users.** Managers set financial performance objectives on which their companies are judged. Creditors and investors, as well as managers, use financial performance evaluation to judge the past performance and current



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position of a company, and also to judge its future potential and the risk associated with it. Creditors use the information gained from their evaluation to make reliable loans that will be repaid with interest. Investors use the information to make investments that will provide a return that is worth the risk.

- 2. Describe and discuss the standards for financial performance evaluation.** Three commonly used standards for financial performance evaluation are rule-of-thumb measures, the company's past performance, and industry norms. Rule-of-thumb measures are weak because of the lack of evidence that they can be widely applied. The past performance of a company can offer a guideline for measuring improvement but is not helpful in judging performance relative to other companies. Although the use of industry norms overcomes this last problem, its disadvantage is that firms are not always comparable, even in the same industry.
- 3. State the sources of information for financial performance evaluation.** The main sources of information about publicly held corporations are company-published reports, such as annual reports and interim financial statements; SEC reports; business periodicals; and credit and investment advisory services.
- 4. Apply horizontal analysis, trend analysis, and vertical analysis to financial statements.** Horizontal analysis involves the computation of changes in both dollar amounts and percentages from year to year. Trend analysis is an extension of horizontal analysis in that percentage changes are calculated for several years. The changes are usually computed by setting a base year equal to 100 and calculating the results for subsequent years as percentages of that base year. Vertical analysis uses percentages to show the relationship of the component parts to a total in a single statement. The resulting financial statements, which are expressed entirely in percentages, are called common-size statements.
- 5. Apply ratio analysis to financial statements in a comprehensive evaluation of a company's financial performance.** A comprehensive ratio analysis includes the evaluation of a company's liquidity, profitability, long-term solvency, cash flow adequacy, and market strength. The ratios for measuring these characteristics are found in Exhibits 8 to 12.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- L03 Asset turnover:** Net sales divided by average total assets. Used to measure how efficiently assets are used to produce sales.
- L05 Average days' inventory on hand:** Days in the year divided by inventory turnover. Shows the average number of days taken to sell inventory.
- L05 Average days' payable:** Days in year divided by payables turnover. Used to measure days to pay accounts payable.
- L05 Average days' sales uncollected:** Days in the year divided by receivable turnover. Shows the speed at which receivables are turned over—literally, the number of days, on average, that a company must wait to receive payment for credit sales.
- L04 Base year:** In financial performance evaluation, the first year to be considered in any set of data.
- L05 Cash flows to assets:** Net cash flows from operating activities divided by average total assets. Used to measure the ability of assets to generate operating cash flows.
- L05 Cash flows to sales:** Net cash flows from operating activities divided by net sales. Used to measure the ability of sales to generate operating cash flows.
- L05 Cash flow yield:** Net cash flows from operating activities divided by net income. Used to measure the ability to generate operating cash flows in relation to net income.

- L04 Common-size statement:** A financial statement in which the components of a total figure are stated as percentages of that total.
- L05 Current ratio:** Current assets divided by current liabilities. Used as a measure of short-term debt-paying ability.
- L05 Debt to equity ratio:** Total liabilities divided by stockholders' equity. Used to measure capital structure and leverage by showing the amount of a company's assets provided by creditors in relation to the amount provided by stockholders.
- L02 Diversified companies:** Companies that operate in more than one industry; also called *conglomerates*.
- L05 Dividends yield:** Dividends per share divided by market price per share. Used as a measure of the current return to an investor in a stock.
- L01 Financial performance evaluation:** All the techniques users of financial statements employ to show important relationships in an organization's financial statements and to relate them to important financial objectives; also called *financial statement analysis*.
- L05 Free cash flow:** Net cash flows from operating activities minus dividends minus net capital expenditures. Used to measure the cash generated or the cash deficiency after providing for commitments.
- L04 Horizontal analysis:** A technique for evaluating financial performance that involves the computation of changes in both dollar amounts and percentages from the previous to the current year.
- L04 Index number:** In trend analysis, a number from which changes in related items over a period of time are measured. Calculated by setting the base year equal to 100 percent.
- L05 Interest coverage ratio:** Income before income taxes plus interest expense divided by interest expense. Used as a measure of the degree of protection creditors have from a default on interest payments.
- L03 Interim financial statement:** A financial statement that reports data for a period of less than one year, usually a quarter or a month.
- L05 Inventory turnover:** The cost of goods sold divided by average inventory. Used to measure the relative size of inventory.
- L05 Operating cycle:** Average days' sales uncollected plus average days' inventory on hand. Shows the time it takes to sell products and collect for them.
- L05 Payables turnover:** Cost of goods sold plus or minus change in inventory divided by average accounts payable. Used to measure relative size of accounts payable.
- L01 Portfolio:** A group of loans or investments designed to average the returns and risks of a creditor or investor.
- L05 Price/earnings (P/E) ratio:** Market price per share divided by earnings per share. Used as a measure of investor confidence in a company and as a means of comparing values among stocks.
- L05 Profit margin:** Net income divided by net sales. Used to measure net income produced by each dollar of sales.
- L05 Quick ratio:** The more liquid current assets—cash, marketable securities or short-term investments, and receivables—divided by current liabilities. Used as a measure of short-term debt-paying ability.
- L04 Ratio analysis:** A technique of financial performance evaluation that identifies meaningful relationships between the components of the financial statements.
- L05 Receivable turnover:** Net sales divided by average accounts receivable. Used as a measure of the relative size of accounts receivable and the effectiveness of credit policies.
- L05 Return on assets:** Net income divided by average total assets. Used to measure overall earning power, or profitability.

- L05 Return on equity:** Net income divided by average stockholders' equity. Used to measure the profitability of stockholders' investments.
- L04 Trend analysis:** A type of horizontal analysis in which percentage changes are calculated for several successive years instead of for two years.
- L04 Vertical analysis:** A technique for evaluating financial performance that uses percentages to show the relationships of the different parts to a total in a single financial statement.

REVIEW PROBLEM

L05 Comparative Evaluation of Two Companies

Maggie Washington is considering an investment in one of two fast-food restaurant chains because she believes the trend toward eating out more often will continue. Her choices have been narrowed to Quik Burger and Big Steak, whose balance sheets and income statements appear below and on the next page.

Balance Sheets December 31, 20xx (In thousands)		
	Quik Burger	Big Steak
Assets		
Cash	\$ 2,000	\$ 4,500
Accounts Receivable (net)	2,000	6,500
Inventory	2,000	5,000
Property, Plant, and Equipment (net)	20,000	35,000
Other Assets	4,000	5,000
Total Assets	<u>\$30,000</u>	<u>\$56,000</u>
Liabilities and Stockholders' Equity		
Accounts Payable	\$ 2,500	\$ 3,000
Notes Payable	1,500	4,000
Bonds Payable	10,000	30,000
Common Stock, \$1 par value	1,000	3,000
Paid-in Capital in Excess of Par Value, Common	9,000	9,000
Retained Earnings	6,000	7,000
Total Liabilities and Stockholders' Equity	<u>\$30,000</u>	<u>\$56,000</u>

The statements of cash flows show that net cash flows from operations were \$2,200,000 for Quik Burger and \$3,000,000 for Big Steak. Net capital expenditures were \$2,100,000 for Quik Burger and \$1,800,000 for Big Steak. Dividends of \$500,000 were paid by Quik Burger and \$600,000 by Big Steak. The market prices of the stocks of Quik Burger and Big Steak were \$30 and \$20, respectively. Financial information pertaining to prior years is not readily available to Maggie Washington. Assume that all notes payable are current liabilities and that all bonds payable are long-term liabilities.

REQUIRED

Conduct a comprehensive ratio analysis of Quik Burger and Big Steak and compare the results. Perform the analysis by carrying out the steps that follow. Use end-of-year balances for averages, assume no change in inventory, and round all ratios and percentages to one decimal place.

1. Prepare an analysis of liquidity.
2. Prepare an analysis of profitability.

Income Statements
For the Year Ended December 31, 20xx
(In thousands, except per share amounts)

	Quik Burger	Big Steak
Net Sales	\$53,000	\$86,000
Costs and Expenses		
Cost of Goods Sold	\$37,000	\$61,000
Selling Expenses	7,000	10,000
Administrative Expenses	4,000	5,000
Total Costs and Expenses	\$48,000	\$76,000
Income from Operations	\$ 5,000	\$10,000
Interest Expense	1,400	3,200
Income Before Income Taxes	\$ 3,600	\$ 6,800
Income Taxes	1,800	3,400
Net Income	\$ 1,800	\$ 3,400
Earnings per Share	\$ 1.80	\$ 1.13

3. Prepare an analysis of long-term solvency.
4. Prepare an analysis of cash flow adequacy.
5. Prepare an analysis of market strength.
6. Indicate in the last column the company that apparently had the more favorable ratio in each case. (Consider differences of .1 or less to be neutral.)
7. In what ways would access to prior years' information aid this analysis?



ANSWER TO REVIEW PROBLEM



Ratio Name	Quik BurgerZ	Big Steak	6. Company with More Favorable Ratio*
1. Liquidity analysis			
a. Current ratio	$\frac{\$2,000 + \$2,000 + \$2,000}{\$2,500 + \$1,500}$ $= \frac{\$6,000}{\$4,000} = 1.5 \text{ times}$	$\frac{\$4,500 + \$6,500 + \$5,000}{\$3,000 + \$4,000}$ $= \frac{\$16,000}{\$7,000} = 2.3 \text{ times}$	Big Steak
b. Quick ratio	$\frac{\$2,000 + \$2,000}{\$2,500 + \$1,500}$ $= \frac{\$4,000}{\$4,000} = 1.0 \text{ times}$	$\frac{\$4,500 + \$6,500}{\$3,000 + \$4,000}$ $= \frac{\$11,000}{\$7,000} = 1.6 \text{ times}$	Big Steak
c. Receivable turnover	$\frac{\$53,000}{\$2,000} = 26.5 \text{ times}$	$\frac{\$86,000}{\$6,500} = 13.2 \text{ times}$	Quik Burger

*This analysis indicates the company with the apparently more favorable ratio. Class discussion may focus on conditions under which different conclusions may be drawn.

(continued)

Ratio Name	Quik Burger	Big Steak	6. Company with More Favorable Ratio
d. Average days' sales uncollected	$\frac{365}{26.5} = 13.8 \text{ days}$	$\frac{365}{13.2} = 27.7 \text{ days}$	Quik Burger
e. Inventory turnover	$\frac{\$37,000}{\$2,000} = 18.5 \text{ times}$	$\frac{\$61,000}{\$5,000} = 12.2 \text{ times}$	Quik Burger
f. Average days' inventory on hand	$\frac{365}{18.5} = 19.7 \text{ days}$	$\frac{365}{12.2} = 29.9 \text{ days}$	Quik Burger
g. Payables turnover	$\frac{\$37,000 + 0}{\$2,500} = 14.8 \text{ times}$	$\frac{\$61,000 + 0}{\$3,000} = 20.3 \text{ times}$	Big Steak
h. Average days' payable	$\frac{365}{14.8} = 24.7 \text{ days}$	$\frac{365}{20.3} = 18.0 \text{ days}$	Big Steak
2. Profitability analysis			
a. Profit margin	$\frac{\$1,800}{\$53,000} = 3.4\%$	$\frac{\$3,400}{\$86,000} = 4.0\%$	Big Steak
b. Asset turnover	$\frac{\$53,000}{\$30,000} = 1.8 \text{ times}$	$\frac{\$86,000}{\$56,000} = 1.5 \text{ times}$	Quik Burger
c. Return on assets	$\frac{\$1,800}{\$30,000} = 6.0\%$	$\frac{\$3,400}{\$56,000} = 6.1\%$	Neutral
d. Return on equity	$\frac{\$1,800}{\$1,000 + \$9,000 + \$6,000} = \frac{\$1,800}{\$16,000} = 11.3\%$	$\frac{\$3,400}{\$3,000 + \$9,000 + \$7,000} = \frac{\$3,400}{\$19,000} = 17.9\%$	Big Steak
3. Long-term solvency analysis			
a. Debt to equity ratio	$\frac{\$2,500 + \$1,500 + \$10,000}{\$1,000 + \$9,000 + \$6,000} = \frac{\$14,000}{\$16,000} = .9 \text{ times}$	$\frac{\$3,000 + \$4,000 + \$30,000}{\$3,000 + \$9,000 + \$7,000} = \frac{\$37,000}{\$19,000} = 1.9 \text{ times}$	Quik Burger
b. Interest coverage ratio	$\frac{\$3,600 + \$1,400}{\$1,400} = \frac{\$5,000}{\$1,400} = 3.6 \text{ times}$	$\frac{\$6,800 + \$3,200}{\$3,200} = \frac{\$10,000}{\$3,200} = 3.1 \text{ times}$	Quik Burger
4. Cash flow adequacy analysis			
a. Cash flow yield	$\frac{\$2,200}{\$1,800} = 1.2 \text{ times}$	$\frac{\$3,000}{\$3,400} = .9 \text{ times}$	Quik Burger
b. Cash flows to sales	$\frac{\$2,200}{\$53,000} = 4.2\%$	$\frac{\$3,000}{\$86,000} = 3.5\%$	Quik Burger
c. Cash flows to assets	$\frac{\$2,200}{\$30,000} = 7.3\%$	$\frac{\$3,000}{\$56,000} = 5.4\%$	Quik Burger
d. Free cash flow	$\$2,200 - \$500 - \$2,100 = (400)$	$\$3,000 - \$600 - \$1,800 = \600	Big Steak

Ratio Name	Quik Burger	Big Steak	6. Company with More Favorable Ratio
5. Market strength analysis			
a. Price/earnings ratio	$\frac{\$30}{\$1.80} = 16.7 \text{ times}$	$\frac{\$20}{\$1.13} = 17.7 \text{ times}$	Big Steak
b. Dividends yield	$\frac{\$500,000/1,000,000}{\$30} = 1.7\%$	$\frac{\$600,000/3,000,000}{\$20} = 1.0\%$	Quik Burger
7. Usefulness of prior years' information			
Prior years' information would be helpful in two ways. First, turnover, return, and cash flows to assets ratios could be based on average amounts. Second, a trend analysis could be performed for each company.			

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

- What are the differences and similarities in the ways investors and creditors use financial performance evaluation?
- What determines the riskiness of a loan or investment?
- What standards of comparison are commonly used to evaluate financial performance, and what are their relative merits?
- Why would a financial analyst compare the ratios of Steelco, a steel company, with the ratios of other companies in the steel industry? What factors might invalidate such a comparison?
- Where may an investor look for information about a publicly held company in which he or she is thinking of investing?
- Why would an investor want to see both horizontal and trend analyses of a company's financial statements?
- What does the following sentence mean: "Based on 1990 equaling 100, net income increased from 240 in 1997 to 260 in 1998"?
- What is the difference between horizontal analysis and vertical analysis?
- What is the purpose of ratio analysis?
- Under what circumstances would a current ratio of 3:1 be good? Under what circumstances would it be bad?
- In a period of high interest rates, why are receivable turnover and inventory turnover especially important?
- The following statements were made on page 35 of the November 6, 1978, issue of *Fortune* magazine: "Supermarket executives are beginning to look back with some nostalgia on the days when the standard profit margin was 1 percent of sales. Last year the industry overall margin came to a thin 0.72 percent." How could a supermarket earn a satisfactory return on assets with such a small profit margin?
- Company A and Company B both have net incomes of \$1,000,000. Is it possible to say that these companies are equally successful? Why or why not?
- Circo Company has a return on assets of 12 percent and a debt to equity ratio of .5. Would you expect return on equity to be more or less than 12 percent?
- What amount is common to all cash flow adequacy ratios? To what other groups of ratios are the cash flow adequacy ratios most closely related?
- The market price of Company J's stock is the same as that of Company Q's. How might you determine whether investors are equally confident about the future of these companies?

SHORT EXERCISES

- LO 1 Objectives and Standards of Financial Performance Evaluation**
- SE 1.** Indicate whether each of the following items is (a) an objective or (b) a standard of comparison of financial performance evaluation.
1. Industry norms
 2. Assessment of the company's past performance
 3. The company's past performance
 4. Assessment of future potential and related risk
 5. Rule-of-thumb measures
- LO 3 Sources of Information**
- SE 2.** For each piece of information listed below, indicate whether the *best* source would be (a) reports published by the company, (b) SEC reports, (c) business periodicals, or (d) credit and investment advisory services.
1. Current market value of a company's stock
 2. Management's analysis of the past year's operations
 3. Objective assessment of a company's financial performance
 4. Most complete body of financial disclosures
 5. Current events affecting the company
- LO 4 Trend Analysis**
- SE 3.** Using 20x0 as the base year, prepare a trend analysis for the following data, and tell whether the results suggest a favorable or an unfavorable trend. (Round your answers to one decimal place.)
- | | 20x2 | 20x1 | 20x0 |
|---------------------------|-----------|-----------|-----------|
| Net sales | \$158,000 | \$136,000 | \$112,000 |
| Accounts receivable (net) | 43,000 | 32,000 | 21,000 |
- LO 4 Horizontal Analysis**
- SE 4.** Compute the amount and percentage changes for the income statements that appear below, and comment on the changes from 20x0 to 20x1. (Round the percentage changes to one decimal place.)

SiteWorks, Inc. Comparative Income Statements For the Years Ended December 31, 20x1 and 20x0		
	20x1	20x0
Net Sales	\$180,000	\$145,000
Cost of Goods Sold	112,000	88,000
Gross Margin	\$ 68,000	\$ 57,000
Operating Expenses	40,000	30,000
Operating Income	\$ 28,000	\$ 27,000
Interest Expense	7,000	5,000
Income Before Income Taxes	\$ 21,000	\$ 22,000
Income Taxes	7,000	8,000
Net Income	\$ 14,000	\$ 14,000
Earnings per share	\$ 1.40	\$ 1.40

- LO 4 Vertical Analysis**
- SE 5.** Express the comparative balance sheets that appear at the top of the next page as common-size statements, and comment on the changes from 20x0 to 20x1. (Round computations to one decimal place.)
- LO 5 Liquidity Analysis**
- SE 6.** Using the information for SiteWorks, Inc., in SE 4 and SE 5, compute the current ratio, quick ratio, receivable turnover, average days' sales uncollected, inventory turnover, average days' inventory on hand, payables turnover, and average days' payable for 20x0

SiteWorks, Inc.
Comparative Balance Sheets
December 31, 20x1 and 20x0

	20x1	20x0
Assets		
Current Assets	\$ 24,000	\$ 20,000
Property, Plant, and Equipment (net)	<u>130,000</u>	<u>100,000</u>
Total Assets	<u>\$154,000</u>	<u>\$120,000</u>
Liabilities and Stockholders' Equity		
Current Liabilities	\$ 18,000	\$ 22,000
Long-Term Liabilities	90,000	60,000
Stockholders' Equity	<u>46,000</u>	<u>38,000</u>
Total Liabilities and Stockholders' Equity	<u>\$154,000</u>	<u>\$120,000</u>

and 20x1. Inventories were \$4,000 in 19x9, \$5,000 in 20x0, and \$7,000 in 20x1. Accounts Receivable were \$6,000 in 19x9, \$8,000 in 20x0, and \$10,000 in 20x1. Accounts Payable were \$9,000 in 19x9, \$10,000 in 20x0, and \$12,000 in 20x1. There were no marketable securities or prepaid assets. Comment on the results. (Round computations to one decimal place.)

LO 5 Profitability Analysis

SE 7. Using the information for SiteWorks, Inc., in SE 4 and SE 5, compute the profit margin, asset turnover, return on assets, and return on equity for 20x0 and 20x1. In 19x9, total assets were \$100,000 and total stockholders' equity was \$30,000. Comment on the results. (Round computations to one decimal place.)

LO 5 Long-Term Solvency Analysis

SE 8. Using the information for SiteWorks, Inc., in SE 4 and SE 5, compute the debt to equity and interest coverage ratios for 20x0 and 20x1. Comment on the results. (Round computations to one decimal place.)

LO 5 Cash Flow Adequacy Analysis

SE 9. Using the information for SiteWorks, Inc., in SE 4, SE 5, and SE 7, compute the cash flow yield, cash flows to sales, cash flows to assets, and free cash flow for 20x0 and 20x1. Net cash flows from operating activities were \$21,000 in 20x0 and \$16,000 in 20x1. Net capital expenditures were \$30,000 in 20x0 and \$40,000 in 20x1. Cash dividends were \$6,000 in both years. Comment on the results. (Round computations to one decimal place.)

LO 5 Market Strength Analysis

SE 10. Using the information for SiteWorks, Inc., in SE 4, SE 5, and SE 9, compute the price/earnings and dividends yield ratios for 20x0 and 20x1. The company had 10,000 shares of common stock outstanding in both years. The price of SiteWorks' common stock was \$30 in 20x0 and \$20 in 20x1. Comment on the results. (Round computations to one decimal place.)

EXERCISES

**LO 1 Objectives, Standards,
LO 2 and Sources of
LO 3 Information for Financial
Performance Evaluation**

E 1. Identify each of the following as (a) an objective of financial performance evaluation, (b) a standard for financial performance evaluation, or (c) a source of information for financial performance evaluation:

1. Average ratios of other companies in the same industry
2. Assessment of the future potential of an investment
3. Interim financial statements
4. Past ratios of the company
5. SEC Form 10-K
6. Assessment of risk
7. A company's annual report

L0 4 Horizontal Analysis

- E 2.** Compute the amount and percentage changes for the following balance sheets, and comment on the changes from 20x1 to 20x2. (Round the percentage changes to one decimal place.)

Fodor Company Comparative Balance Sheets December 31, 20x2 and 20x1		
	20x2	20x1
Assets		
Current Assets	\$ 37,200	\$ 25,600
Property, Plant, and Equipment (net)	218,928	194,400
Total Assets	<u>\$256,128</u>	<u>\$220,000</u>
Liabilities and Stockholders' Equity		
Current Liabilities	\$ 22,400	\$ 6,400
Long-Term Liabilities	70,000	80,000
Stockholders' Equity	163,728	133,600
Total Liabilities and Stockholders' Equity	<u>\$256,128</u>	<u>\$220,000</u>

L0 4 Trend Analysis

- E 3.** Using 20x1 as the base year, prepare a trend analysis of the following data, and tell whether the situation shown by the trends is favorable or unfavorable. (Round your answers to one decimal place.)

	20x5	20x4	20x3	20x2	20x1
Net sales	\$25,520	\$23,980	\$24,200	\$22,880	\$22,000
Cost of goods sold	17,220	15,400	15,540	14,700	14,000
General and administrative expenses	5,280	5,184	5,088	4,896	4,800
Operating income	3,020	3,396	3,572	3,284	3,200

L0 4 Vertical Analysis

- E 4.** Express the comparative income statements that follow as common-size statements, and comment on the changes from 20x1 to 20x2. (Round computations to one decimal place.)

Fodor Company Comparative Income Statements For the Years Ended December 31, 20x2 and 20x1		
	20x2	20x1
Net Sales	\$424,000	\$368,000
Cost of Goods Sold	254,400	239,200
Gross Margin	<u>\$169,600</u>	<u>\$128,800</u>
Selling Expenses	\$106,000	\$ 73,600
General Expenses	50,880	36,800
Total Operating Expenses	<u>\$156,880</u>	<u>\$110,400</u>
Net Operating Income	<u>\$ 12,720</u>	<u>\$ 18,400</u>

LO 5 Liquidity Analysis

- E 5.** Partial comparative balance sheet and income statement information for Road Company follows.

	20x2	20x1
Cash	\$ 6,800	\$ 5,200
Marketable Securities	3,600	8,600
Accounts Receivable (net)	22,400	17,800
Inventory	27,200	24,800
Total Current Assets	<u>\$ 60,000</u>	<u>\$ 56,400</u>
Accounts Payable	<u>\$ 20,000</u>	<u>\$ 14,100</u>
Net Sales	\$161,280	\$110,360
Cost of Goods Sold	108,800	101,680
Gross Margin	<u>\$ 52,480</u>	<u>\$ 8,680</u>

The year-end balances for Accounts Receivable and Inventory were \$16,200 and \$25,600, respectively, in 20x0. Accounts Payable was \$15,300 in 20x0 and is the only current liability.

Compute the current ratio, quick ratio, receivable turnover, average days' sales uncollected, inventory turnover, average days' inventory on hand, payables turnover, and average days' payable for each year. (Round computations to one decimal place.) Comment on the change in the company's liquidity position, including its operating cycle and required days of financing from 20x1 to 20x2.

LO 5 Turnover Analysis

- E 6.** Davis FormalWear Shop has been in business for four years. Because the company has recently had a cash flow problem, management wonders whether there is a problem with receivables or inventories.

Here are selected figures from Davis FormalWear Shop's financial statements (in thousands):

	20x4	20x3	20x2	20x1
Net sales	\$288	\$224	\$192	\$160
Cost of goods sold	180	144	120	96
Accounts receivable (net)	48	40	32	24
Merchandise inventory	56	44	32	20
Accounts payable	25	20	15	10

Compute receivable turnover, inventory turnover, and payables turnover for each of the four years, and comment on the results relative to the cash flow problem that Davis FormalWear Shop has been experiencing. Merchandise inventory was \$22,000, accounts receivable was \$22,000 and accounts payable was \$8,000 in 20x0. Round computations to one decimal place.

LO 5 Profitability Analysis

- E 7.** At year end, Jareau Company had total assets of \$640,000 in 20x0, \$680,000 in 20x1, and \$760,000 in 20x2. Its debt to equity ratio was .67 in all three years. In 20x1, the company had net income of \$77,112 on revenues of \$1,224,000. In 20x2, the company had net income of \$98,952 on revenues of \$1,596,000. Compute the profit margin, asset turnover, return on assets, and return on equity for 20x1 and 20x2. Comment on the apparent cause of the increase or decrease in profitability. (Round the percentages and other ratios to one decimal place.)

LO 5 Long-Term Solvency and Market Strength Ratios

- E 8.** An investor is considering investing in the long-term bonds and common stock of Companies F and G. Both companies operate in the same industry. In addition, both companies pay a dividend per share of \$4 and a yield of 10 percent on their long-term bonds. Other data for the two companies appear on the next page.

	Company F	Company G
Total assets	\$2,400,000	\$1,080,000
Total liabilities	1,080,000	594,000
Income before income taxes	288,000	129,600
Interest expense	97,200	53,460
Earnings per share	3.20	5.00
Market price of common stock	40	47.50

Compute the debt to equity, interest coverage, price/earnings (P/E), and dividends yield ratios, and comment on the results. (Round computations to one decimal place.)

LO 5 Cash Flow Adequacy Analysis

- E 9.** Using the data below, taken from the financial statements of Wong, Inc., compute the cash flow yield, cash flows to sales, cash flows to assets, and free cash flow. (Round computations to one decimal place.)

Net sales	\$6,400,000
Net income	704,000
Net cash flows from operating activities	912,000
Total assets, beginning of year	5,780,000
Total assets, end of year	6,240,000
Cash dividends	240,000
Net capital expenditures	596,000

PROBLEMS

LO 4 Horizontal and Vertical Analysis

- P 1.** The condensed comparative income statements and balance sheets of Sanborn Corporation appear below and on the next page. All figures are given in thousands of dollars.



Sanborn Corporation Comparative Income Statements For the Years Ended December 31, 20x2 and 20x1		
	20x2	20x1
Net Sales	\$3,276,800	\$3,146,400
Cost of Goods Sold	<u>2,088,800</u>	<u>2,008,400</u>
Gross Margin	<u>\$1,188,000</u>	<u>\$1,138,000</u>
Operating Expenses		
Selling Expenses	\$ 476,800	\$ 518,000
Administrative Expenses	<u>447,200</u>	<u>423,200</u>
Total Operating Expenses	<u>\$ 924,000</u>	<u>\$ 941,200</u>
Income from Operations	\$ 264,000	\$ 196,800
Interest Expense	<u>65,600</u>	<u>39,200</u>
Income Before Income Taxes	\$ 198,400	\$ 157,600
Income Taxes	<u>62,400</u>	<u>56,800</u>
Net Income	<u>\$ 136,000</u>	<u>\$ 100,800</u>
Earnings per share	<u>\$ 3.40</u>	<u>\$ 2.52</u>

REQUIRED

Perform the following analyses. Round all ratios and percentages to one decimal place.

1. Prepare schedules showing the amount and percentage changes from 20x1 to 20x2 for Sanborn's comparative income statements and balance sheets.

Sanborn Corporation
Comparative Balance Sheets
December 31, 20x2 and 20x1

	20x2	20x1
Assets		
Cash	\$ 81,200	\$ 40,800
Accounts Receivable (net)	235,600	229,200
Inventory	574,800	594,800
Property, Plant, and Equipment (net)	750,000	720,000
Total Assets	<u>\$1,641,600</u>	<u>\$1,584,800</u>
Liabilities and Stockholders' Equity		
Accounts Payable	\$ 267,600	\$ 477,200
Notes Payable (short-term)	200,000	400,000
Bonds Payable	400,000	—
Common Stock, \$10 par value	400,000	400,000
Retained Earnings	374,000	307,600
Total Liabilities and Stockholders' Equity	<u>\$1,641,600</u>	<u>\$1,584,800</u>

2. Prepare common-size income statements and balance sheets for 20x1 and 20x2.
3. Comment on the results in 1 and 2 by identifying favorable and unfavorable changes in the components and composition of the statements.

LO 5 Analyzing the Effects of Transactions on Ratios

- P 2.** Koz Corporation engaged in the transactions listed in the first column of the following table. Opposite each transaction is a ratio and space to indicate the effect of each transaction on the ratio.



Transaction	Ratio	Effect		
		Increase	Decrease	None
a. Sold merchandise on account.	Current ratio			
b. Sold merchandise on account.	Inventory turnover			
c. Collected on accounts receivable.	Quick ratio			
d. Wrote off an uncollectible account.	Receivable turnover			
e. Paid on accounts payable.	Current ratio			
f. Declared cash dividend.	Return on equity			
g. Incurred advertising expense.	Profit margin			
h. Issued stock dividend.	Debt to equity ratio			
i. Issued bond payable.	Asset turnover			
j. Accrued interest expense.	Current ratio			
k. Paid previously declared cash dividend.	Dividends yield			
l. Purchased treasury stock.	Return on assets			
m. Recorded depreciation expense.	Cash flow yield			

REQUIRED

Place an X in the appropriate column to show whether the transaction increased, decreased, or had no effect on the indicated ratio.

LO 5 Ratio Analysis

- P 3.** Additional data (in thousands of dollars) for Sanborn Corporation in 20x2 and 20x1 follow. This information should be used in conjunction with the data in P 1.

	20x2	20x1
Net cash flows from operating activities	(\$196,000)	\$144,000
Net capital expenditures	\$40,000	\$65,000
Dividends paid	\$44,000	\$34,400
Number of common shares	40,000,000	40,000,000
Market price per share	\$18	\$30

Selected balances (in thousands of dollars) at the end of 20x0 were Accounts Receivable (net), \$206,800; Inventory, \$547,200; Total Assets, \$1,465,600; Accounts Payable, \$386,600; and Stockholders' Equity, \$641,200. All of Sanborn's notes payable were current liabilities; all of the bonds payable were long-term liabilities.

REQUIRED

Perform the following analyses. Round all answers to one decimal place, and consider changes of .1 or less to be neutral. After making the calculations, indicate whether each ratio improved or deteriorated from 20x1 to 20x2 by writing *F* for favorable or *U* for unfavorable.

1. Prepare a liquidity analysis by calculating for each year the (a) current ratio, (b) quick ratio, (c) receivable turnover, (d) average days' sales uncollected, (e) inventory turnover, (f) average days' inventory on hand, (g) payables turnover, and (h) average days' payable.
2. Prepare a profitability analysis by calculating for each year the (a) profit margin, (b) asset turnover, (c) return on assets, and (d) return on equity.
3. Prepare a long-term solvency analysis by calculating for each year the (a) debt to equity ratio and (b) interest coverage ratio.
4. Prepare a cash flow adequacy analysis by calculating for each year the (a) cash flow yield, (b) cash flows to sales, (c) cash flows to assets, and (d) free cash flow.
5. Prepare a market strength analysis by calculating for each year the (a) price/earnings ratio and (b) dividends yield.

LO 5 Comprehensive Ratio Analysis of Two Companies

- P 4.** Ginger Adair is considering an investment in the common stock of a chain of retail department stores. She has narrowed her choice to two retail companies, Lewis Corporation and Ramsey Corporation, whose income statements and balance sheets are shown on the next page. During the year, Lewis Corporation paid a total of \$100,000 in dividends. The market price per share of its stock is currently \$60. In comparison, Ramsey Corporation paid a total of \$228,000 in dividends, and the current market price of its stock is \$76 per share. Lewis Corporation had net cash flows from operations of \$543,000 and net capital expenditures of \$1,250,000. Ramsey Corporation had net cash flows from operations of \$985,000 and net capital expenditures of \$2,100,000. Information for prior years is not readily available. Assume that all notes payable are current liabilities and all bonds payable are long-term liabilities and that there is no change in inventory.

REQUIRED

Conduct a comprehensive ratio analysis for each company, using the available information. Compare the results. Round percentages and ratios to one decimal place, and consider changes of .1 or less to be indeterminate.

1. Prepare an analysis of liquidity by calculating for each company the (a) current ratio, (b) quick ratio, (c) receivable turnover, (d) average days' sales uncollected, (e) inventory turnover, (f) average days' inventory on hand, (g) payables turnover, and (h) average days' payable.
2. Prepare an analysis of profitability by calculating for each company the (a) profit margin, (b) asset turnover, (c) return on assets, and (d) return on equity.
3. Prepare an analysis of long-term solvency by calculating for each company the (a) debt to equity ratio and (b) interest coverage ratio.
4. Prepare an analysis of cash flow adequacy by calculating for each company the (a) cash flow yield, (b) cash flows to sales, (c) cash flows to assets, and (d) free cash flow.

	Lewis Corporation	Ramsey Corporation
Assets		
Cash	\$ 160,000	\$ 384,800
Marketable Securities	406,800	169,200
Accounts Receivable (net)	1,105,600	1,970,800
Inventories	1,259,600	2,506,800
Prepaid Expenses	108,800	228,000
Property, Plant, and Equipment (net)	5,827,200	13,104,000
Intangibles and Other Assets	1,106,400	289,600
Total Assets	<u>\$9,974,400</u>	<u>\$18,653,200</u>
Liabilities and Stockholders' Equity		
Accounts Payable	\$ 688,000	\$ 1,145,200
Notes Payable	300,000	800,000
Income Taxes Payable	100,400	146,800
Bonds Payable	4,000,000	4,000,000
Common Stock, \$20 par value	2,000,000	1,200,000
Paid-in Capital in Excess of Par Value, Common	1,219,600	7,137,200
Retained Earnings	1,666,400	4,224,000
Total Liabilities and Stockholders' Equity	<u>\$9,974,400</u>	<u>\$18,653,200</u>

	Lewis Corporation	Ramsey Corporation
Net Sales	<u>\$25,120,000</u>	<u>\$50,420,000</u>
Costs and Expenses		
Cost of Goods Sold	\$12,284,000	\$29,668,000
Selling Expenses	9,645,200	14,216,400
Administrative Expenses	1,972,000	4,868,000
Total Costs and Expenses	<u>\$23,901,200</u>	<u>\$48,752,400</u>
Income from Operations	\$ 1,218,800	\$ 1,667,600
Interest Expense	388,000	456,000
Income Before Income Taxes	\$ 830,800	\$ 1,211,600
Income Taxes	400,000	600,000
Net Income	<u>\$ 430,800</u>	<u>\$ 611,600</u>
Earnings per share	<u>\$ 4.31</u>	<u>\$ 10.19</u>

- Prepare an analysis of market strength by calculating for each company the (a) price/earnings ratio and (b) dividends yield.
- Indicate in the right-hand column which company had the more favorable ratio in each case.
- How could the analysis be improved if information from prior years were available?

ALTERNATE PROBLEMS

LO 5 Analyzing the Effects of Transactions on Ratios

P 5. Benson Corporation, a clothing retailer, engaged in the transactions listed in the first column of the table below. Opposite each transaction is a ratio and space to mark the effect of each transaction on the ratio.

Transaction	Ratio	Effect		
		Increase	Decrease	None
a. Issued common stock for cash.	Asset turnover			
b. Declared cash dividend.	Current ratio			
c. Sold treasury stock.	Return on equity			
d. Borrowed cash by issuing note payable.	Debt to equity ratio			
e. Paid salaries expense.	Inventory turnover			
f. Purchased merchandise for cash.	Current ratio			
g. Sold equipment for cash.	Receivable turnover			
h. Sold merchandise on account.	Quick ratio			
i. Paid current portion of long-term debt.	Return on assets			
j. Gave sales discount.	Profit margin			
k. Purchased marketable securities for cash.	Quick ratio			
l. Declared 5 percent stock dividend.	Current ratio			
m. Purchased a building.	Free cash flow			

REQUIRED

Place an X in the appropriate column to show whether the transaction increased, decreased, or had no effect on the indicated ratio.

LO 5 Ratio Analysis

P 6. The condensed comparative income statements and balance sheets of Basic Corporation appear below and on the next page. All figures are given in thousands of dollars, except earnings per share.

Basic Corporation Comparative Income Statements For the Years Ended December 31, 20x2 and 20x1		
	20x2	20x1
Net Sales	\$800,400	\$742,600
Cost of Goods Sold	454,100	396,200
Gross Margin	\$346,300	\$346,400
Operating Expenses		
Selling Expenses	\$130,100	\$104,600
Administrative Expenses	140,300	115,500
Total Operating Expenses	\$270,400	\$220,100
Income from Operations	\$ 75,900	\$126,300
Interest Expense	25,000	20,000
Income Before Income Taxes	\$ 50,900	\$106,300
Income Taxes	14,000	35,000
Net Income	\$ 36,900	\$ 71,300
Earnings per share	\$ 1.23	\$ 2.38

Basie Corporation
Comparative Balance Sheets
December 31, 20x2 and 20x1

	20x2	20x1
Assets		
Cash	\$ 31,100	\$ 27,200
Accounts Receivable (net)	72,500	42,700
Inventory	122,600	107,800
Property, Plant, and Equipment (net)	577,700	507,500
Total Assets	<u>\$803,900</u>	<u>\$685,200</u>
Liabilities and Stockholders' Equity		
Accounts Payable	\$104,700	\$ 72,300
Notes Payable (due in less than one year)	50,000	50,000
Bonds Payable	200,000	110,000
Common Stock, \$10 par value	300,000	300,000
Retained Earnings	149,200	152,900
Total Liabilities and Stockholders' Equity	<u>\$803,900</u>	<u>\$685,200</u>

Additional data for Basie Corporation in 20x2 and 20x1 are as follows:

	20x2	20x1
Net cash flows from operating activities	\$64,000	\$99,000
Net capital expenditures	\$119,000	\$38,000
Dividends paid	\$31,400	\$35,000
Number of common shares	30,000	30,000
Market price per share	\$40	\$60

Balances of selected accounts at the end of 20x0 were Accounts Receivable (net), \$52,700; Inventory, \$99,400; Accounts Payable, \$64,800; Total Assets, \$647,800; and Stockholders' Equity, \$376,600. All of the bonds payable were long-term liabilities.

REQUIRED

Perform the following analyses. Round percentages and ratios to one decimal place, and consider changes of .1 or less to be neutral. After making the calculations, indicate whether each ratio had a favorable (*F*) or unfavorable (*U*) change from 20x1 to 20x2.

- Conduct a liquidity analysis by calculating for each year the (a) current ratio, (b) quick ratio, (c) receivable turnover, (d) average days' sales uncollected, (e) inventory turnover, (f) average days' inventory on hand, (g) payables turnover, and (h) average days' payable.
- Conduct a profitability analysis by calculating for each year the (a) profit margin, (b) asset turnover, (c) return on assets, and (d) return on equity.
- Conduct a long-term solvency analysis by calculating for each year the (a) debt to equity ratio and (b) interest coverage ratio.
- Conduct a cash flow adequacy analysis by calculating for each year the (a) cash flow yield, (b) cash flows to sales, (c) cash flows to assets, and (d) free cash flow.
- Conduct a market strength analysis by calculating for each year the (a) price/earnings ratio and (b) dividends yield.

EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

LO 2 Standards for Financial LO 5 Performance Evaluation



SD 1. *Helene Curtis*, a well-known, publicly owned corporation, became a takeover candidate and sold out in the 1990s after years of poor profit performance. "By almost any standard, Chicago-based Helene Curtis rates as one of America's worst-managed personal care companies. In recent years its return on equity has hovered between 10% and 13%, well below the industry average of 18% to 19%. Net profit margins of 2% to 3% are half that of competitors. . . . As a result, while leading names like Revlon and Avon are trading at three and four times book value, Curtis trades at less than two-thirds book value."⁶ Considering that many companies in other industries are happy with a return on equity of 10 percent to 13 percent, why is this analysis so critical of Curtis's performance? Assuming that Curtis could double its profit margin, what other information would be necessary to project the resulting return on stockholders' investment? Why are Revlon's and Avon's stocks trading for more than Curtis's? Be prepared to discuss your answers to these questions in class.

LO 3 Using Segment Information



SD 2. Refer to Exhibit 1, which shows the segment information of *Goodyear Tire & Rubber Company*. In what business segments does Goodyear operate? What is the relative size of the business segments in terms of sales and total segment income in the most recent year? Which segment is most profitable in terms of the performance measure return on assets? In the tires segment, which region of the world is largest and which is most profitable in terms of return on assets?

LO 3 Use of Published Reports



SD 3. Refer to Exhibit 2, which contains the *PepsiCo, Inc.*, listing from Mergent's *Handbook of Dividend Achievers*. Assume that an investor has asked you to assess PepsiCo's recent history and prospects. Write a memorandum to the investor that addresses the following points:

1. PepsiCo's earnings history. (What generally has been the relationship between PepsiCo's return on assets and its return on equity over the years 1993 to 1999? What does this tell you about the way the company is financed? What figures back up your conclusion?)
2. The trend of PepsiCo's stock price and price/earnings ratio for the seven years shown.
3. PepsiCo's prospects, including developments that are likely to affect the future of the company.

Ethical Dilemma

LO 3 Management of Earnings



SD 4. Managers of most companies are very sensitive to the fact that analysts watch key performance measures, such as whether the firm is meeting earnings targets. A slight weakening of analysts' confidence can severely affect the price of a company's stock. The Securities and Exchange Commission (SEC) has been cracking down on the management of earnings to achieve financial goals by targeting companies for review. For instance, the SEC filed a complaint against *W. R. Grace & Co.* for releasing \$1.5 mil-



lion from reserves into earnings in order to meet earnings targets. Grace officials say that the amount is immaterial and that it is in accord with accounting rules to book an immaterial item. (It was about 1.5 percent of net income.) The SEC, on the other hand, argues that it is a matter of principle: "Does anyone think that it's acceptable to intentionally book an error for the purpose of making earnings targets?" Some think such action on the part of the SEC will harm confidence in the companies.⁷ Do you think it is unethical for a company's management to increase earnings periodically through the use of one-time transactions, such as adjustments of reserves or sale of assets, on which it has a profit?

Research Activity

LO 3 Use of Investors' Services



SD 5.

Find *Moody's Investors Service* or *Standard & Poor's Industry Guide* in your library. Locate reports on three corporations. You may choose the corporations at random or choose them from the same industry, if directed to do so by your instructor. (If you did a related exercise in a previous chapter, use the same three companies.) Write a summary of what you learned about each company's financial performance, including what measures of performance were mentioned in the write-ups and the company's prospects for the future, and be prepared to discuss your findings in class.

LO 4 Effect of One-Time Item LO 5 on Loan Decision



SD 6.

Apple a Day, Inc., and *Unforgettable Edibles, Inc.*, both operate food catering businesses in the metropolitan area. Their customers include *Fortune* 500 companies, regional firms, and individuals. The two firms reported similar profit margins for the current year, and both determine bonuses for managers based on reaching a target profit margin and return on equity. Each firm has submitted a loan request to you, a loan officer for City National Bank, with the following information:

	Apple a Day	Unforgettable Edibles
Net Sales	\$625,348	\$717,900
Cost of Goods Sold	225,125	287,080
Gross Margin	\$400,223	\$430,820
Operating Expenses	281,300	371,565
Operating Income	\$118,923	\$ 59,255
Gain on Sale of Real Estate		81,923
Interest Expense	(9,333)	(15,338)
Income Before Income Taxes	\$109,590	\$125,840
Income Taxes	25,990	29,525
Net Income	\$ 83,600	\$ 96,315
Average Stockholders' Equity	\$312,700	\$390,560

1. Perform a vertical analysis and prepare a common-size income statement for each firm. Compute profit margin and return on equity.
2. Discuss your results, the bonus plan for management, and loan considerations. Make a recommendation about which company is a better risk for receiving the loan.

FINANCIAL REPORTING AND ANALYSIS

Interpreting Financial Reports

- FRA 1. *H. J. Heinz Company* is a global company engaged in several lines of business, including food service, infant foods, condiments, pet foods, tuna, and weight control food products. A five-year summary of operations and other related data for Heinz appears at the top of the next page.⁸

LO 4 Trend Analysis



Five-Year Summary of Operations and Other Related Data
H. J. Heinz Company and Subsidiaries

	1999	1998	1997	1996	1995
	(Dollars in thousands, except per share data)				
Summary of Operations					
Sales	\$9,299,610	\$9,209,284	\$9,397,007	\$9,112,265	\$8,086,794
Cost of products sold	5,944,867	5,711,213	6,385,091	5,775,357	5,119,597
Interest expense	258,815	258,616	274,746	277,411	210,585
Provision for income taxes	360,790	453,415	177,193	364,342	346,982
Net income	474,341	801,566	301,871	659,319	591,025
Other Related Data					
Dividends paid: Common	484,817	452,966	416,923	381,871	345,358
Total assets	8,053,634	8,023,421	8,437,787	8,623,691	8,247,188
Total debt	3,376,413	5,806,905	5,997,366	3,363,828	3,401,076
Shareholders' equity	1,803,004	2,216,516	2,440,921	2,706,757	2,472,869

REQUIRED

Prepare a trend analysis for Heinz with 1995 as the base year and discuss the results. Identify important trends and tell whether the trends are favorable or unfavorable. Discuss significant relationships among the trends.

International Company
LO 5 Comparison of International Company Operating Cycles
FRA 2.

Ratio analysis enables one to compare the performance of companies whose financial statements are presented in different currencies. For instance, selected 1999 data for two large pharmaceutical companies—one American, *Pfizer, Inc.*, and one Swiss, *Roche*—are presented below (in millions):⁹



	Pfizer, Inc. (U.S.)	Roche (Swiss)
Net Sales	\$14,133	SFr.27,567
Cost of Goods Sold	2,528	8,734
Accounts Receivable	3,864	6,178
Inventories	1,654	6,546
Accounts Payable	951	2,378

Accounts receivable in 1998 were \$2,914 for Pfizer and SFr.4,535 for Roche. Inventories in 1998 were \$1,828 for Pfizer and SFr.5,389 for Roche. Accounts payable in 1998 were \$971 for Pfizer and SFr.2,088 for Roche.

For each company calculate the receivable, inventory, and payables turnovers and the respective days associated with each. Then determine the operating cycle for each company and the days of financing required for current operations. Compare the results.



Group Activity: Divide the class into groups to make the calculations. Ask half of the groups to analyze Pfizer and the other half to analyze Roche. Have the entire class compare and discuss results.

Toys "R" Us Annual Report**FRA 3.**
LO 5 Comprehensive Ratio Analysis

Refer to the Toys "R" Us annual report, and conduct a comprehensive ratio analysis that compares data from 2000 and 1999. If you have been computing ratios for Toys "R" Us in previous chapters, you may prepare a table that summarizes the ratios for 2000 and 1999 and show calculations only for the ratios not previously calculated. If this is the first time you are doing a ratio analysis for Toys "R" Us, show all your computations. In



either case, after each group of ratios, comment on the performance of Toys "R" Us. Round your calculations to one decimal place. Prepare and comment on the following categories of ratios:

Liquidity analysis: Current ratio, quick ratio, receivable turnover, average days' sales uncollected, inventory turnover, average days' inventory on hand, payables turnover, and average days' payable (Accounts Receivable, Inventory, and Accounts Payable were [in millions] \$175, \$2,464, and \$1,280, respectively, in 1998.)

Profitability analysis: Profit margin, asset turnover, return on assets, and return on equity (Comment on the effect of the restructuring in 1999 on the company's profitability.)

Long-term solvency analysis: Debt to equity ratio and interest coverage ratio

Cash flow adequacy analysis: Cash flow yield, cash flows to sales, cash flows to assets, and free cash flow

Market strength analysis: Price/earnings ratio and dividends yield

Fingraph® Financial Analyst™

Choose any company in the Fingraph® Financial Analyst™ CD-ROM software database.

1. Display and print for the company you have selected the following pages:
 - a. Balance Sheet Analysis
 - b. Current Assets and Current Liabilities Analysis
 - c. Liquidity and Asset Utilization Analysis
 - d. Income from Operations Analysis
 - e. Statement of Cash Flows: Operating Activities Analysis
 - f. Statement of Cash Flows: Investing and Financing Activities Analysis
 - g. Market Strength Analysis
2. Prepare an executive summary that describes the financial condition and performance of your company for the past two years. Attach the pages you printed above in support of your analysis.

Internet Case

Through the Needles Accounting Resource Center at <http://college.hmco.com>, go to the web site for **Moody's Investors Service**. Click on Ratings, which will show revisions of debt ratings issued by Moody's in the past few days. Choose a rating that has been upgraded or downgraded and read the short press announcement related to it. What reasons does Moody's give for the change in rating? What is Moody's assessment of the future of the company or institution? What financial performance measures are mentioned in the article? Write a summary of your findings and be prepared to share it in class.

LO 5 Comprehensive Financial Performance Evaluation



FRA 4.

LO 2 Use of Investors' Services

LO 3



FRA 5.

ENDNOTES

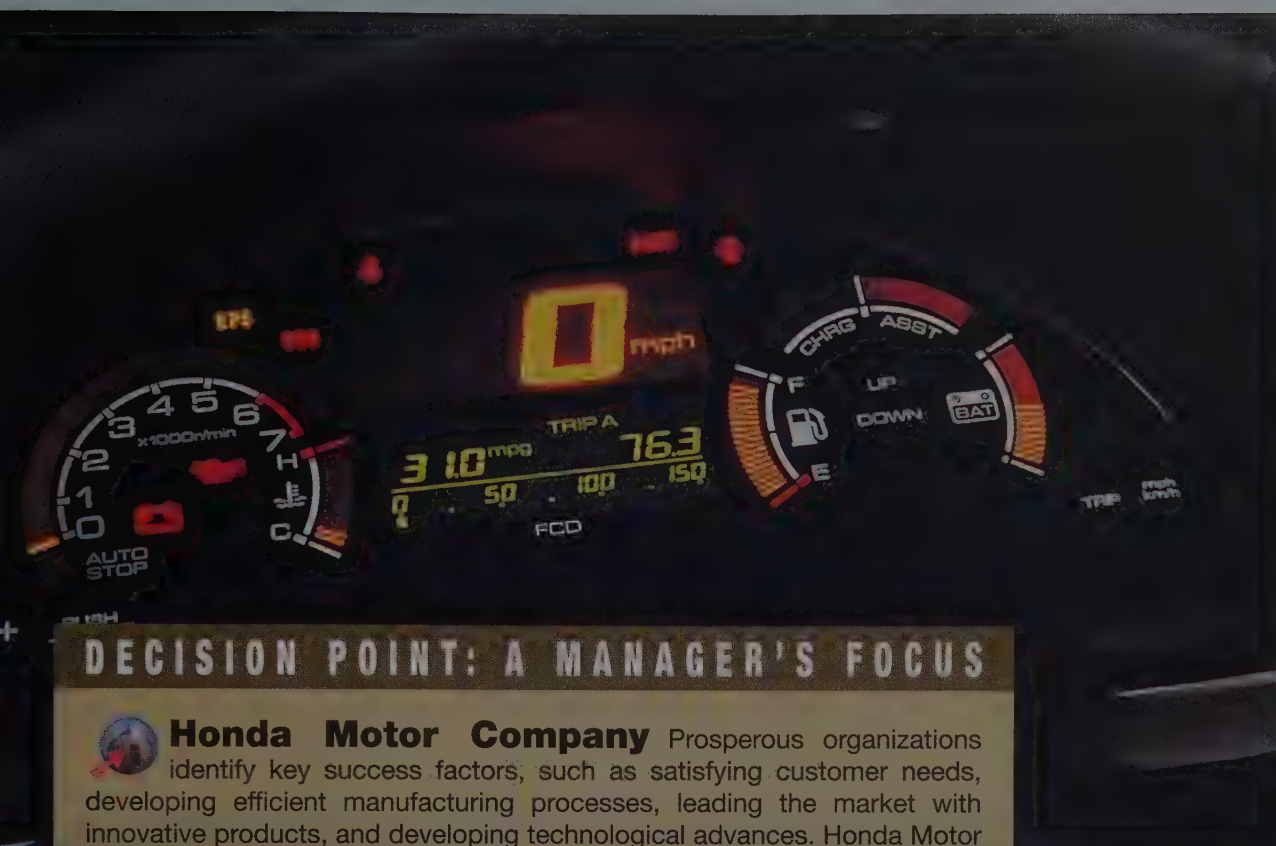
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A Manager's Perspective: The Changing Business Environment

LEARNING OBJECTIVES

- 1 Define *management accounting* and distinguish between management accounting and financial accounting.
- 2 Explain the management cycle and its connection to management accounting.
- 3 Identify the management philosophies of continuous improvement and discuss the role of management accounting in implementing those philosophies.
- 4 Define *performance measures*, recognize the uses of those measures in the management cycle, and prepare an analysis of nonfinancial data.
- 5 Identify the important questions a manager must consider before requesting or preparing a management report.
- 6 Compare accounting for inventories and cost of goods sold in service, merchandising, and manufacturing organizations.
- 7 Identify the standards of ethical conduct for management accountants.



DECISION POINT: A MANAGER'S FOCUS

 **Honda Motor Company** Prosperous organizations identify key success factors, such as satisfying customer needs, developing efficient manufacturing processes, leading the market with innovative products, and developing technological advances. Honda Motor Co. had all of these key success factors in mind as it entered the market with the introduction of Insight, its next-generation “green car,” to be sold in the United States. This vehicle is a hybrid, running on both a gas engine and an electric motor. Priced at less than \$20,000, the Insight gets more than 70 miles to the gallon. One of several second-generation green cars, it meets both the regulators’ demand for zero-emission vehicles and consumers’ demand for inexpensive, practical transportation.¹

Satisfying consumers’ needs and meeting regulators’ demands through the introduction of new technologies and innovative vehicle designs are just part of Honda’s strategy to stay agile, flexible, and ahead of its competitors. Equally important for Honda is the development of efficient manufacturing operations. Over the next few years, by experimenting with new manufacturing methods, Honda “should become capable of halving the time and cost for a new-model introduction,” says Masaki Iwai, Honda’s senior managing director.² The way Honda plans to achieve those savings on new models runs counter to traditional wisdom among big auto producers: that an auto maker must sell four million vehicles a year to recoup the cost of developing new technologies and models. In contrast, Honda’s president, Hiroyuki Yoshino, states, “If you spend small, then you don’t have to sell a lot to be profitable.” So Honda is standardizing manufacturing tools and eliminating the need to modify its assembly lines. Model-specific sub-assembly lines will feed their products to a new, shorter vehicle assembly line. Subassemblies are also Honda’s answer to containing costs, maintaining quality, and staying independent. Honda executives question the current industry practice of outsourcing so much work to parts suppliers that control over quality and product integration may be sacrificed.

All of these innovations demonstrate Honda’s desire to maintain its reputation as an industry leader. Honda needs objective, quantifiable performance standards to measure its ability to attain the key success factors

mentioned above. What is management accounting's role in the design and production of a vehicle like the Insight? What performance measures would you suggest for developing efficient manufacturing processes and satisfying customer needs related to the Insight?

Management accounting has provided and will continue to provide Honda with relevant, useful information for making decisions about the selling and leasing prices for the car and the cost of new materials and new production processes. Management accounting uses tools such as budgets and performance measures to help Honda managers develop, manufacture, sell, and distribute the Insight using limited resources. Budgets influence daily operating goals for the workers and provide targets for evaluating the workers' performance. Performance measures for the production process may include the time to complete one cycle of the production process, the number of setups, and the time to rework errors in the production process. Number of customer complaints, number of service change notices, and number of customer referrals are potential performance measures of customer satisfaction. As Honda continues to improve the Insight through time and cost savings, management accounting will provide quantifiable information to support Honda's achievement of its strategic key success factors.

VIDEO CASE



Objectives

- To define management accounting.
- To describe the management cycle and its connection to management accounting.
- To recognize performance measures.

Background for the Case

UPS, one of the largest package distribution companies in the world, transports more than three billion parcels and documents annually. UPS supports its commitment to serving the needs of customers throughout the world with more than 500 airplanes, 147,000 vehicles, and 2,400 facilities in over 200 countries.



Like many other companies, UPS relies on management accounting information to plan, execute, review, and report

its business activities. Management accounting helps managers at UPS make better decisions about embracing new technology, managing environmental issues, and improving fuel efficiency.



For more information about UPS, visit the company's web site through the Needles Accounting Resource Center web site at:

<http://college.hmco.com>

Required

View the video on UPS that accompanies this book. As you are watching the video, take notes related to the following questions:

1. In your own words, how would you define management accounting?
2. Describe the management cycle and explain how management accounting information helps managers at UPS move through each stage of the management cycle.
3. Define the term *performance measures* and give examples of some performance measures used by UPS.

What Is Management Accounting?

OBJECTIVE

1 Define *management accounting* and distinguish between management accounting and financial accounting

Management accounting consists of accounting techniques and procedures for gathering and reporting financial, production, and distribution data to meet management's information needs. The management accountant is expected to provide timely, accurate information—including budgets, standard costs, variance analyses, support for day-to-day operating decisions, and analyses of capital expenditures. The Institute of Management Accountants defines **management accounting** as

the process of identification, measurement, accumulation, analysis, preparation, interpretation, and communication of financial [and nonfinancial] information used by management to plan, evaluate, and control within the organization and to assure appropriate use and accountability for its resources.³

The information that management accountants gather and analyze is used to support the actions of management. All business managers need accurate and timely information to support pricing, planning, operating, and many other types of decisions. Managers of manufacturing, merchandising, government, and service organizations all depend on management accounting information. Multidivisional corporations need larger amounts of information and more complex accounting and reporting systems than do small businesses. But small and medium-sized businesses make use of certain types of financial and operating information as well. The types of data needed to ensure efficient operating conditions do not depend entirely on an organization's size.

Management accounting information helps organizations make better decisions. Such decisions make all organizations become more cost-effective and help manufacturing, retail, and service organizations become more profitable. Financial accounting takes the results of management decisions about the actual operating, investing, and financing activities and prepares reports for external parties (investors, creditors, and governmental agencies).

Both management accounting and financial accounting (1) provide an information system crucial to reporting and analysis, (2) provide reports used by individuals to analyze and make decisions, and (3) develop relevant, objective product cost information for valuing inventories included on the balance sheet.

Table 1 compares management accounting to financial accounting. Management accounting data are essential for management planning, control, performance measurement, and decision making. Employees and managers need accounting information to handle daily operations efficiently and effectively, so as to achieve the organization's goals. Management reports are very flexible. Either historical or future information may be reported without any formal guidelines or restrictions. The information may communicate dollar amounts or physical measures of time or objects, such as number of hours worked or number of inspections. The information may be relevant and objective for decision-making purposes or may be more subjective for estimating future activities. Management accounting reports can be prepared monthly, quarterly, or annually. Management may also request reports daily or for special purposes.

In contrast, financial accounting communicates economic information to external parties. In profit-generating organizations, such as manufacturing, retail, and service organizations, owners and creditors contribute money to assist managers in investing in resources and generating profits from operating activities. Government agencies, such as the Internal Revenue Service and the Securities and Exchange Commission, also require reports. Managers must distribute financial reports to those parties to show the organization's actual performance. The reports are histor-

Table 1. Comparison of Management and Financial Accounting

Areas of Comparison	Management Accounting	Financial Accounting
Report format	Flexible format, driven by user's needs	Based on generally accepted accounting principles
Purpose of reports	Provide information for planning, control, performance measurement, and decision making	Report on past performance
Primary users	Employees, managers, suppliers	Owners, lenders, customers, government agencies
Units of measure	Historical or future dollar; physical measure in time or number of objects	Historical dollar
Nature of information	Future-oriented; objective for decision making, more subjective for planning; relies on estimates	Historical, objective
Frequency of reports	Prepared as needed; may or may not be on a regular basis	Prepared on a regular basis (minimum of once a year)

ical and measured in dollars. Generally accepted accounting principles require that specific standards and procedures be followed in the preparation of these reports. Financial reports include objective information that is prepared and distributed regularly, usually on an annual basis.

Management Accounting and the Management Cycle

OBJECTIVE

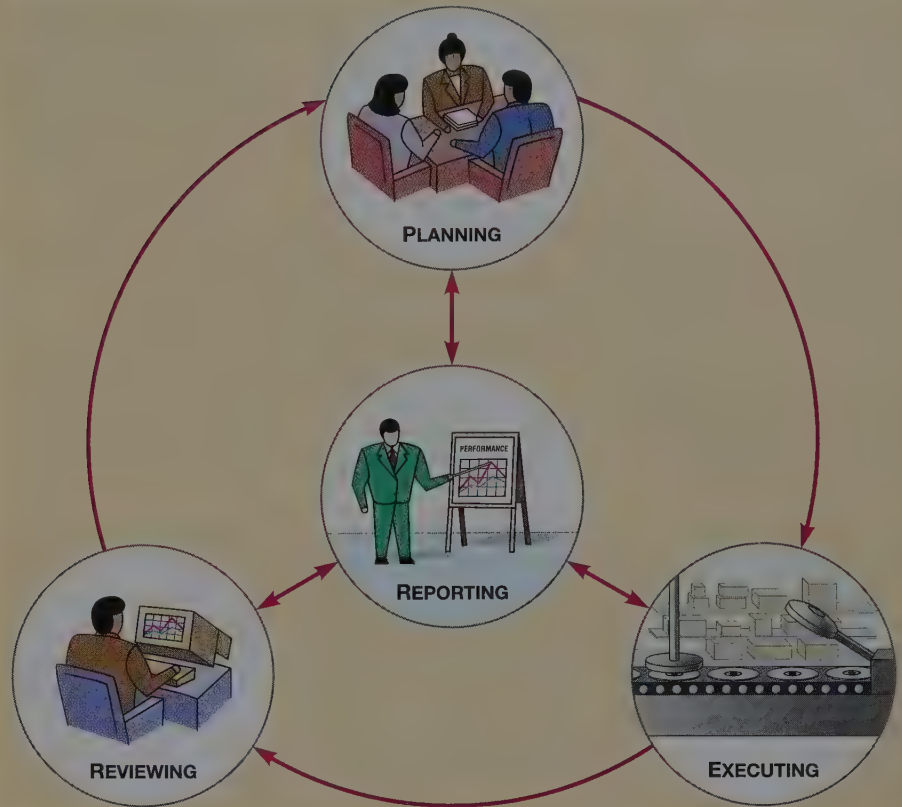
2 Explain the management cycle and its connection to management accounting

To better understand the relationship between management and management accounting, let's take a look at the management cycle and the connections between it and management accounting.

The Management Cycle

Management is expected to use resources wisely, operate profitably, pay debts, and abide by laws and regulations. These expectations motivate managers to establish the objectives, goals, and strategic plans of the organization and to guide and control

Figure 1
The Management Cycle



operating, investing, and financing activities to reach those goals. The management process differs from organization to organization, but traditionally management operates in four stages: (1) planning, (2) executing, (3) reviewing, and (4) reporting. Figure 1 illustrates these stages as an overall management cycle. Each stage of the cycle is discussed below.

PLANNING Management needs to plan the future operating, investing, and financing activities of the organization. Appropriate objectives and goals must be established and organizational policies enacted. Strategic planning represents the formulation of long-term tactics, objectives, and organizational policies. Management strives to complement the organization's strategic plans with annual operating plans. The development of strategic and operating plans requires managers to make decisions concerning various alternatives. These plans often include expectations about the performance of individuals, working teams, products, or services.

EXECUTING Planning alone does not guarantee satisfactory operating results. Management must implement the strategic and operating plans by executing activities, or tasks, in ways that maximize the use of available resources. Smooth operations require one or more of the following: (1) hiring and training of personnel, (2) properly matching human and technical resources to the work that must be done, (3) purchasing or leasing facilities, (4) maintaining an inventory of products for sale, and (5) identifying operating activities, or tasks, that minimize waste and improve the quality of the products or services.

Management performs, or executes the plan, by overseeing the daily operations of the organization. In small organizations, managers often have frequent direct contact with their employees. They supervise their employees and interact with

them to help them learn or complete a task or to improve their performance. In larger, more complex organizations, there may be less direct contact between managers and employees. Instead of directly watching employees, management monitors performance by measuring the actual time taken to complete an activity (for example, number of inspection hours) or the frequency of an activity (such as number of inspections).

REVIEWING In many organizations, financial rewards are given to those managers who follow the plan and manage their resources well. Thus, control of operations becomes very important to managers. Often managers compare actual performance to the expected performance established at the planning stage. Any significant differences are then identified for further analysis. Problems that arise may be corrected, or the original plans may be revised as a result of changes in the organization's operating environment. Ideally, the adjustments made in this review stage will improve the performance of future activities.

REPORTING Because managers have an obligation to use resources wisely, management is responsible for reporting the results of operations to external parties. Periodic summaries of past performance are sent to stockholders, creditors, and other people who are interested in the organization's operations. Also, internal reports about evaluations of past performance compared to plans provide useful information for management decision making.

How Management Accounting Supports the Management Cycle

Management accounting serves the many information needs of managers by (1) developing plans and analyzing alternatives; (2) communicating plans to key personnel; (3) evaluating performance; (4) reporting the results of activities; and (5) accumulating, maintaining, and processing an organization's financial and nonfinancial information. These management accounting activities complement the management cycle.


For example, let's suppose that Abbie Awani is about to open her own retail business, Sweet Treasures Candy Store. She plans to purchase candy and other confections from various candy manufacturers and to sell them after some repackaging. What types of information does Awani need before she opens the doors of her new store? Her first need is for a business plan so that she can apply for a

start-up loan from a local bank. This plan includes a full description of the business as well as a complete budget for the first two years of operations. The budget includes a forecasted income statement, a forecasted statement of cash flows, and a forecasted balance sheet for both years.

Since Awani does not have a financial background, she will consult a local accounting firm to help her with this project. But she can provide relevant input into the business plan. She needs to decide (1) the types of candy she wants to sell; (2) the volume of sales she anticipates; (3) the selling price for each product; (4) the monthly costs of leasing or purchasing facilities, employing personnel, and maintaining the facilities; and (5) the number of display counters, storage units, and cash registers that she will need.

Once she obtains the loan and opens the business, Awani's information needs continue. She must now

FOCUS ON BUSINESS TECHNOLOGY



When Toys "R" Us formed an independent e-commerce unit, toysrus.com, its managers developed a business plan. They analyzed alternative ways in which the online unit could function within Toys "R" Us. What advantages would toysrus.com have over its online competition? The majority-owned Internet unit has its parent's international buying power, its customers can pick up and return purchases through the worldwide network of Toys "R" Us retail stores, and its name is already known.⁴

measure how well her business is doing. She also needs budgeted goals to guide her in evaluating the store's actual performance. Decisions such as spending on advertising campaigns, pricing for special sales, and hiring temporary versus full-time personnel are also linked to her business plan. Actual revenues and expenses must be compared to the planned amounts and any differences explained. Reasons for such differences may lead Awani to change parts of her original business plan.

Awani may also want to measure and evaluate the past performance of employees. This information will help her to develop new strategies or goals. For example, keeping a record of the number of complaints about poor customer service can help her improve quality by finding better ways to train personnel or change the service delivery process.

In addition, Sweet Treasures Candy Store needs management accounting information about the purchase of display counters and office equipment; the selection, training, and compensation of employees; and the marketing, production, and distribution of its products. Abbie Awani can use this information to plan operations, organize resources, execute business activities, and review the performance of her employees and her business.

This example illustrates the connection between management accounting and the management cycle. Management accounting can provide a constant stream of relevant information. Compare Awani's activities and informational needs with the management cycle shown in Figure 1. She started with a business plan, executed the plan, and reviewed the results. Accounting information helped her to develop her business plan, communicate that plan to the banker and employees, evaluate the performance of employees, and report the results of operations for a period of time. As you can see, accounting plays a critical role in managing the operations of an organization.

Meeting the Demands of Global Competition

Today, managers around the world have ready access to worldwide markets and current information for informed decision making. As a result, global competition is increasing. The worldwide availability of an ever-increasing variety of high-quality, low-cost goods has led managers to seek new and improved ways of doing

FOCUS ON INTERNATIONAL BUSINESS

Global e-commerce has radically changed the way goods and services such as plane tickets, books, automobiles, and even medical help are sold. In most places, products and services are on sale 24 hours a day, with next-day delivery. These revolutionary changes in the way business is conducted have created a vast array of new opportunities. But they have also forced

managers to recognize the important role that performance measures play in remaining competitive. Now organizations set performance targets for all areas of their operation, such as new-product development, purchasing, marketing, sales, shipping, and customer satisfaction. Such measures are developed and tracked by management accountants. The Business and Industry Executive Committee (formerly the Management Accounting Executive Committee) of the American Institute of Certified Public Accountants has coined the term *new finance* to describe this revolution in management accounting.⁵

business and providing services. In response, several management philosophies that help managers remain competitive by focusing on the continuous improvement of their business and manufacturing processes have emerged.

Management Philosophies of Continuous Improvement

OBJECTIVE

3 Identify the management philosophies of continuous improvement and discuss the role of management accounting in implementing those philosophies

Several significant management philosophies evolved in the United States to deal with expanding global competition: just-in-time operating techniques, total quality management, activity-based management, and the theory of constraints.

JUST-IN-TIME OPERATING PHILOSOPHY The **just-in-time operating philosophy** requires that all resources, including materials, personnel, and facilities, be acquired and used only as needed. Its objectives are to improve productivity and eliminate waste. Under the JIT approach, workers are trained to be multitasked, and production processes are consolidated to allow workers to operate several different machines or processes. Raw materials and parts are scheduled to be delivered when they are needed in the production process, so materials inventories are reduced significantly. Products are produced continuously, so work in process inventories are very small. Goods are usually produced only when an order is received and are shipped when completed, so inventories of finished goods are reduced.

Adopting the JIT operating philosophy results in reduced production time, reduced investment in raw materials inventory, reduced materials waste, higher-quality goods, and reduced production costs. Funds that are no longer invested in inventory can be redirected according to the goals of the strategic plan. The accounting system responds to the new philosophy by tracking the costs of the product differently. JIT processes help companies such as Wal-Mart, General Motors, AT&T, and Harley-Davidson assign more accurate costs to their products and identify the costs of waste and inefficient manufacturing activities.



TOTAL QUALITY MANAGEMENT **Total quality management (TQM)** is a philosophy that requires that all functions work together to build quality into the organization's product or service. TQM has many of the same characteristics as the JIT operating philosophy. Workers function as team members and are empowered to make operating decisions that improve both the product or service and the work environment. TQM focuses on improving product quality by identifying and reducing or eliminating the waste of resources caused by poor product or service quality. Emphasis is placed on using resources efficiently and effectively to prevent poor quality and on examining current operations to spot possible causes of poor quality. Improved quality of both the work environment and the product or service is the goal of TQM. Like JIT, TQM results in reduced waste of materials, higher-quality goods, and lower production costs in manufacturing environments like those of Hewlett-Packard and Kodak, and time savings and higher-quality services in service organizations like USAA and Federal Express.



To determine the impact of poor quality on profits, management uses accounting information about the magnitude and classification of the costs of quality. The **costs of quality** include both the costs of achieving quality (such as training costs and inspection costs) and the costs of poor quality (such as rework costs and costs of handling customer complaints) in the manufacture of a product or the delivery of a service.



Managers at companies such as Motorola and General Electric use cost of quality information to (1) connect the organization's strategic goals with daily operating activities, (2) stimulate improvement by involving everyone, (3) identify opportunities for reducing customer dissatisfaction, (4) identify major opportunities for cost reduction, and (5) determine the costs of quality relative to net

income. For example, Motorola measures defects per unit and cycle time. Doing a job right the first time and doing it in the shortest amount of time means that Motorola can produce near-perfect products in an error-free environment. This approach is applied to products, processes, and everything Motorola does.

ACTIVITY-BASED MANAGEMENT **Activity-based management (ABM)** is an approach to managing an organization that identifies all major operating activities, determines what resources are consumed by each activity, identifies what causes resource usage of each activity, and categorizes the activities as either adding value to a product or service or not adding value. ABM includes a management accounting practice called activity-based costing. **Activity-based costing (ABC)** identifies all of an organization's major operating activities (both production and nonproduction), traces costs to those activities, and then assigns costs to products or services that use the resources and services supplied by those activities.

Activities that add value to a product or service, as perceived by the customer, are known as **value-adding activities**. Such activities improve product or service quality and customer satisfaction. All other activities are called **nonvalue-adding activities**. They add cost to a product or service but do not increase its market value. Nonvalue-adding activities that are needed because they support the organization are focal points for cost reduction. Nonvalue-adding activities that do not support the organization are eliminated. ABM results in reduced costs, reduced waste of resources, increased efficiency, and increased customer satisfaction. In addition, ABC produces more accurate costs, which leads to improved decision making.

For example, suppose you and three of your friends are planning to take a skiing trip during the winter break. You call a local travel agency to obtain an estimated cost for a three-day winter skiing package. The package includes skiing, food, lodging, and entertainment. The travel agent quotes a flat fee of \$400 per person, or a total of \$1,600. But you and your friends would rather not pay a flat fee. Instead, you would prefer to plan your own trip and identify the cost of each activity (skiing, eating, sleeping, entertainment).

How would you assign the \$1,600 total cost of the trip to four people? The easiest way would be to follow the travel agent's approach and require each person to pay a flat fee of \$400, which is one-fourth of the total cost. But what if one person does not plan to ski? Should that person pay for a portion of the skiing costs? What if another person eats much more than the other three people? Should he or she pay the same amount for food as everyone else? What if two people plan to stay only two days? Should they pay the full price?

The issue is how to assign costs fairly if each individual is involved in different activities. Each individual should be accountable to the others for making a fair payment relative to his or her level of involvement in each activity.

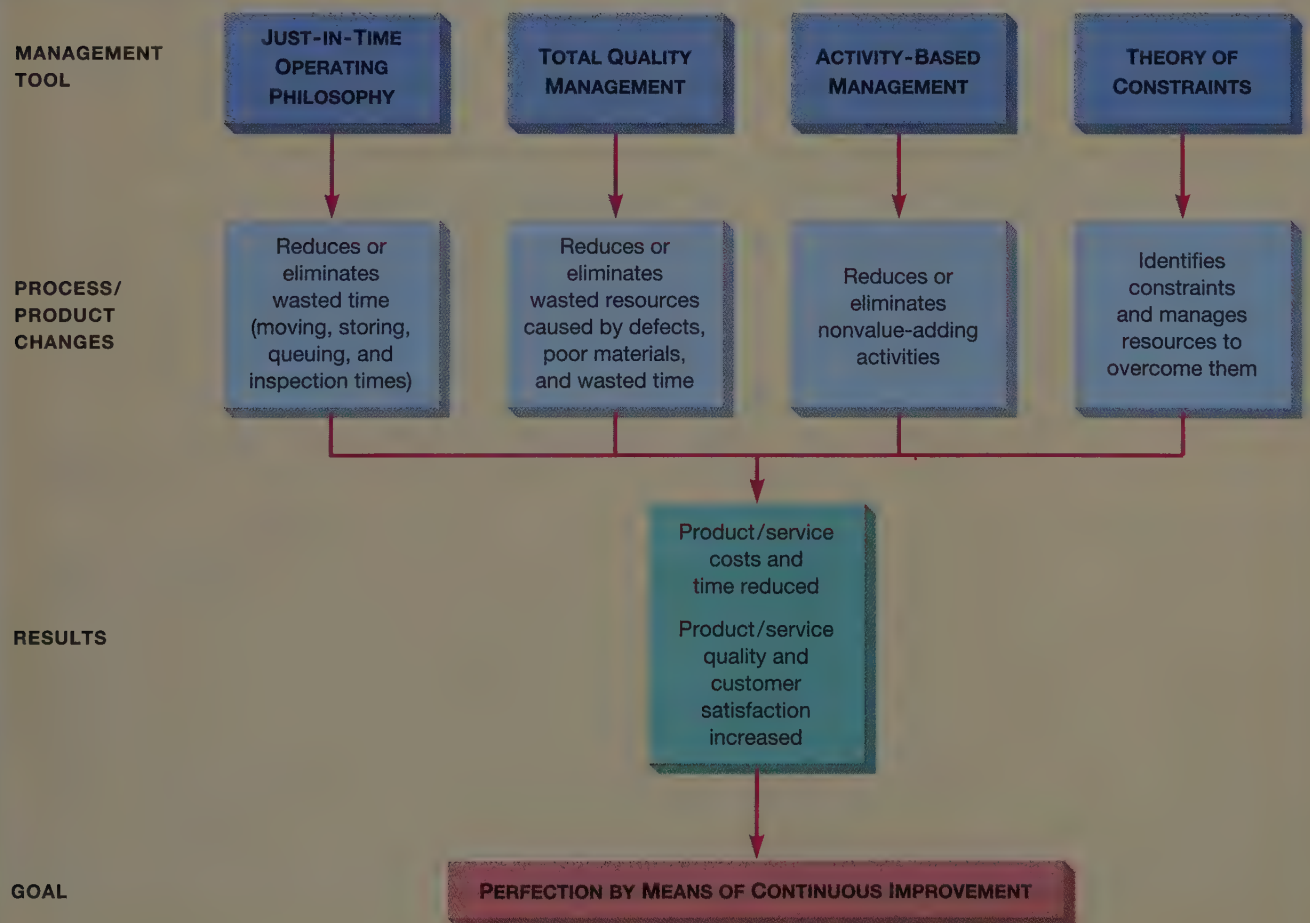
THEORY OF CONSTRAINTS According to the **theory of constraints (TOC)**, limiting factors, or bottlenecks, occur during the production of any product or service. Once managers identify such a limitation, or constraint, they can focus attention and resources on it and thus achieve significant improvements. TOC helps managers set priorities for how they spend their time and other resources. For example, a marketing manager wanted to increase sales of doughnut-shaped chew toys for dogs. She realized, however, that potential sales were limited by the number of doughnut-shaped chew toys her company's manufacturing plant could produce. More specifically, she traced the limitation to the molding machine, which could shape only 1,000 toys per hour. To overcome the limitation, the manager persuaded the vice president of manufacturing to purchase a second molding machine. She could not expect to improve sales until she had more toys to sell.

TOC complements JIT, TQM, and ABM by focusing resources on efforts that will yield the most effective improvements.

The Goal: Continuous Improvement

One of the most valuable lessons gained from the emergence of stiff global competition was that management cannot afford to become complacent. The concept of continuous improvement evolved to avoid such complacency. Organizations that adhere to **continuous improvement** are never satisfied with what is; they constantly seek a better method, product, service, process, or resource. Their goal is perfection in everything they do. JIT, TQM, ABM, and TOC all have perfection by means of continuous improvement as their goal. Figure 2 shows how each approach is used to try to accomplish this goal. In the just-in-time operating environment, management wages a relentless war on waste: wasted time, wasted space, and wasted use of materials. All employees are encouraged to continuously look for ways to improve processes and save time. Total quality management focuses on improving the quality of the product or service and the work environment. It pursues continuous improvement by reducing the number of defective products and the amount of time wasted in completing a task or providing a service. Activity-

Figure 2
The Continuous Improvement Environment



based management seeks continuous improvement by emphasizing the ongoing reduction or elimination of nonvalue-adding activities. The theory of constraints helps managers focus resources on the efforts that will produce the most effective improvements.

Each of these management tools can be used as an individual system, or parts of them can be combined to create a new operating environment. Some aspects of them can be employed in service industries, such as banking, as well as in manufacturing. By continuously trying to improve and fine-tune operations, these management tools contribute to the same basic results for any organization: Product or service costs and delivery time are reduced, and the quality of the product or service and customer satisfaction are increased.

Performance Measures and the Analysis of Nonfinancial Data

OBJECTIVE

4 Define *performance measures*, recognize the uses of those measures in the management cycle, and prepare an analysis of nonfinancial data

Performance measures are quantitative tools that gauge an organization's performance in relation to a specific goal or an expected outcome. Performance measures may be financial or nonfinancial. Financial performance measures include return on investment, net income as a percentage of sales, and the costs of poor quality as a percentage of sales. All of these examples use monetary information to measure the performance of a profit-generating organization or its segments, such as divisions, departments, product lines, sales territories, or operating activities.

Nonfinancial performance measures can include the number of times an object (product, service, or activity) occurs or the time taken to perform a task. Examples include number of customer complaints, number of orders shipped the same day, hours of inspection, and time to fill an order. Such performance measures are useful in reducing or eliminating waste and inefficiencies in operating activities.

Use of Performance Measures in the Management Cycle

Management uses performance measures in all stages of the management cycle. In the planning stage, management establishes performance measures, or benchmarks, to motivate performance that will support the goals and objectives of the strategic plan. For example, many organizations want employees to increase quality, reduce costs, increase customer satisfaction, and increase efficiency and timeliness. As you will recall from earlier in the chapter, Abbie Awani selected the number of customer complaints as a performance measure to monitor service quality.

During the executing stage, performance measures guide and motivate the performance of employees and assist in assigning costs to products, departments, or operating activities. Awani will record the number of customer complaints during the year. She can group the information by type of complaint or the employee involved in the service.

In the reviewing stage, management uses performance measures to improve future performance by analyzing significant differences between actual and planned performance. By comparing the actual and planned number of customer complaints, Awani can identify problem areas and consider solutions.

In the reporting stage, performance measurement information is useful in communicating performance evaluations and developing new budgets. If Awani needed a formal report, she could have her accountant prepare a performance evaluation analysis based on this information.

The Balanced Scorecard

One approach that helps managers analyze both financial and nonfinancial performance measures is the balanced scorecard. The **balanced scorecard** is a framework that links the perspectives of an organization's stakeholder groups—financial (investors), learning and growth (employees), internal business processes, and customers—with the organization's mission and vision, performance measures, strategic plan, and resources. Holders of the financial perspective value improvements in financial measures, such as net income and return on investment. Those who take the learning and growth perspective value high wages, job security, and opportunities for all employees to fulfill their potential. Those who focus on internal business processes are interested in how manufacturing happens. They value the safe and cost-effective production of high-quality products. Finally, holders of the customer perspective value high-quality, low-cost products. Although their perspectives differ, stakeholders can share an interest in common, measurable performance targets.



The balanced scorecard framework helps an organization to measure and evaluate itself from a variety of viewpoints. Organizations that use a balanced scorecard can continuously improve because they have clear, measurable performance targets that acknowledge the interdependence and differing perspectives of their stakeholder groups. For example, in its balanced scorecard, Whirlpool measures financial performance, customer satisfaction, total quality, people commitment, and growth and innovation. Such performance measures, which lead to satisfied customers, investors, and employees and which continuously improve internal business processes, create value for all of an organization's stakeholder groups.

Analysis of Nonfinancial Data

Managers often face situations that require the analysis of nonfinancial data. For instance, managers can use nonfinancial measures to monitor changes in internal business processes and determine whether performance targets are being met. The following example illustrates how a manager uses nonfinancial data to analyze changes in a service organization.

Lynda Babb supervises tellers at Kings Beach National Bank. The bank has three drive-up windows, each with a full-time teller. Historically, each teller served an average of 30 customers per hour. However, on November 1, 20x5, management implemented a new check-scanning procedure that has cut back the number of customers served per hour.

Data on the number of customers served for the three-month period ended December 31, 20x5, are shown in Part A of Exhibit 1. Each teller works an average of 170 hours per month. Window 1 is always the busiest; Windows 2 and 3 receive progressively less business. The October figure of 30 customers per hour is derived from the averages for all three windows.

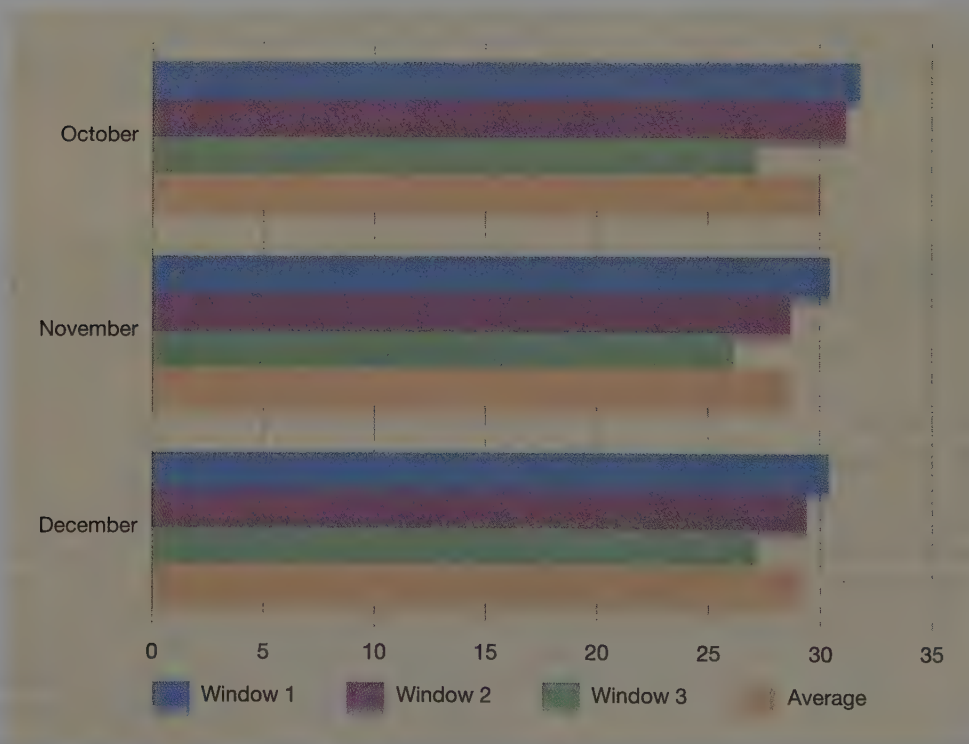
Ms. Babb is preparing a report for management on the effects of the new procedure. Part B of Exhibit 1 shows her analysis of the number of customers served over the three months by each teller window. She computed the number of customers served per hour by dividing the number of customers served by the monthly average hours worked per teller (170). By averaging the customer service rates for the three tellers, she got 28.43 customers per hour per window for November and 28.83 customers for December. As you can see, the service rate has decreased since October. But December's average is higher than November's, which means the tellers, as a group, are becoming more accustomed to the new procedure. Part C of Exhibit 1 is a graphic comparison of the number of customers served per hour.

Exhibit 1
Analysis of Nonfinancial
Data—Bank

Kings Beach National Bank
Summary of Number of Customers Served
For the Quarter Ended December 31, 20x5

Part A		Number of Customers Served			
Window	October	November	December	Quarter Totals	
1	5,428	5,186	5,162	15,776	
2	5,280	4,820	4,960	15,060	
3	4,593	4,494	4,580	13,667	
Totals	<u>15,301</u>	<u>14,500</u>	<u>14,702</u>	<u>44,503</u>	
Part B		Number of Customers Served per Hour			
Window	October	November	December	Quarter Averages	
1	31.93	30.51	30.36	30.93	
2	31.06	28.35	29.18	29.53	
3	<u>27.02</u>	<u>26.44</u>	<u>26.94</u>	<u>26.80</u>	
Totals	<u>90.01</u>	<u>85.30</u>	<u>86.48</u>	<u>87.26</u>	
Average per hour per window	<u>30.00</u>	<u>28.43</u>	<u>28.83</u>	<u>29.09</u>	

Part C: Graphic Comparison of the Number of Customers Served per Hour



Management Accounting Reports and Analyses

OBJECTIVE

5 Identify the important questions a manager must consider before requesting or preparing a management report

As a manager, you may need to recommend the purchase of a particular machine, request money to develop a new form of packaging, or present a marketing plan for your organization's most popular product or service. Regardless of the assignment, you will have to prepare some type of report. Often the report will require relevant accounting information to support your position.

The keys to successful report preparation are the four *Ws*: Why? Who? What? and When? Keep the following points in mind as you prepare your report.

- **Why?** Know the purpose of the report. Focus on it as you write.
- **Who?** Identify the audience for your report. Communicate at a level that matches your audience's understanding of the issue and their familiarity with accounting information. A detailed, informal report may be appropriate for your manager, but a more concise summary may be necessary for other audiences, such as the president or board of directors of your organization.
- **What?** What information is needed? *Select the relevant information.* Know the sources of that information. You may draw information from specific documents or from interviews with knowledgeable managers and employees.
What method of presentation is best? *Develop the most effective method of presentation.* The information should be relevant and easy to read and understand. You may need to include visuals, such as bar charts or graphs, to present accounting information.
- **When?** Know the due date for the report. Strive to prepare an accurate report on a timely basis. Remember that you may have to balance accuracy and timeliness. Some accuracy may be lost if the report is urgent.

You have an opportunity to develop your skills in reporting accounting information. At the end of each management accounting chapter, you will find Managerial Reporting and Analysis problems that ask you to formulate reports that include accounting information.

Service, Merchandising, and Manufacturing Organizations

OBJECTIVE

6 Compare accounting for inventories and cost of goods sold in service, merchandising, and manufacturing organizations

Service organizations, merchandising organizations, and manufacturing organizations all prepare income statements and balance sheets. Their financial statements illustrate the four *Ws* of successful reports. Reporting on the financial health of the organization is the purpose, or *why*. The owners, creditors, and outside parties for whom the reports are prepared are the audience, or *who*. The facts about assets, liabilities, service or product costs, and sales presented in the reports are the necessary information, or *what*. The use of generally accepted presentation methods to report the information is also related to *what*. Completing and filing the statements by the required reporting deadline answers the question of *when*.

The financial statements of service, merchandising, and manufacturing organizations differ in format and content because the operations of the three kinds of organizations differ. Let's look at how these organizations' operations, income statements, and balance sheets differ.

Service organizations

- sell services, not products,
- maintain no inventory accounts on the balance sheet, and
- determine the cost of services sold instead of calculating the cost of goods sold.

Merchandising organizations

- purchase products that are ready for resale,
- maintain only one inventory account on the balance sheet, and
- include the cost of purchases in the calculation of cost of goods sold.

Manufacturing organizations

- design and manufacture products for sale,
- maintain three inventory accounts on the balance sheet, and
- include the cost of goods manufactured in the calculation of cost of goods sold.



Service organizations, such as UPS, Enterprise Rent-a-Car, and Accenture (formerly Andersen Consulting), provide services such as package delivery, rental cars, and consulting expertise. Service organizations maintain no inventories for resale. To calculate the cost of sales for a service organization, the following equation is used:

$$\text{Cost of Sales} = \text{Net Cost of Services Sold}$$

For example, Sweet Treasures Candy Store contracts with UPS to deliver 50 boxes of candy. The cost of sales for UPS would include the wages and salaries of personnel plus the expenses of trucks, planes, supplies, and anything consumed by UPS to deliver the packages for Sweet Treasures.



Merchandising organizations, such as Wal-Mart, Toys “R” Us, and Home Depot, purchase products that are ready for resale. These organizations maintain one inventory account, called Merchandise Inventory, that reflects the costs of products held for resale. To calculate the cost of goods sold for a merchandising organization, the following equation is used:

$$\text{Cost of Goods Sold} = \begin{array}{c} \text{Beginning} \\ \text{Merchandise} \\ \text{Inventory} \end{array} + \begin{array}{c} \text{Net Cost of} \\ \text{Purchases} \end{array} - \begin{array}{c} \text{Ending} \\ \text{Merchandise} \\ \text{Inventory} \end{array}$$

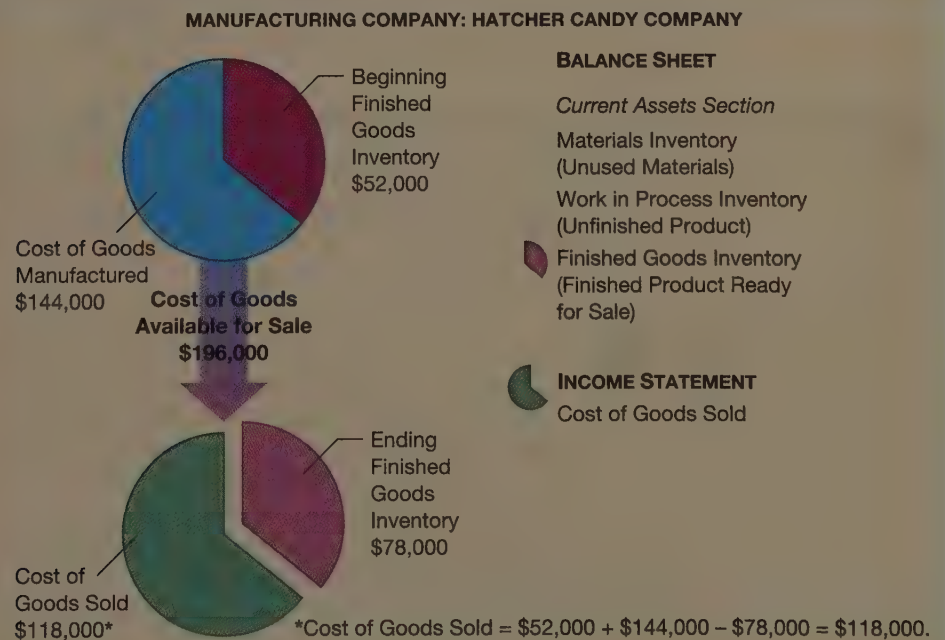
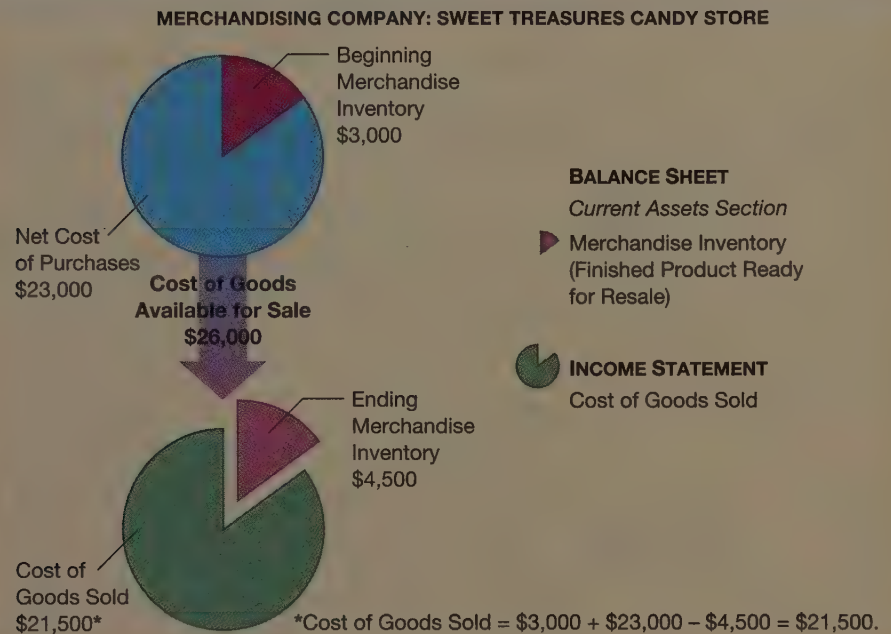
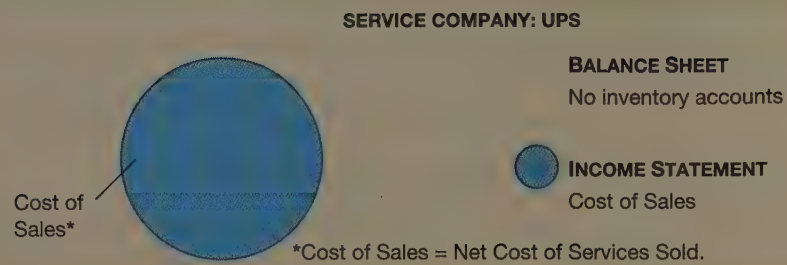
For example, Sweet Treasures Candy Store had a balance of \$3,000 in the Merchandise Inventory account on December 31, 20x2. During the next year, the company purchased candy products totaling \$23,000 (adjusted for purchase discounts, purchases returns and allowances, and freight-in). At December 31, 20x3, the Merchandise Inventory balance was \$4,500. The cost of goods sold is thus \$21,500 for the period 20x3.



$$\text{Cost of Goods Sold} = \$3,000 + \$23,000 - \$4,500 = \$21,500$$

Manufacturing organizations, such as Motorola, Sony, and IBM, use materials, labor, and manufacturing overhead to manufacture products for sale. Materials are purchased and used in the production process. The Materials Inventory account shows the balance of the cost of unused materials. During the production process, the costs of manufacturing the product are accumulated in the Work in Process Inventory account. The balance of the Work in Process Inventory account represents the costs of unfinished product. Once the product is complete and ready for sale, the cost of the goods manufactured is transferred to and reflected in the Finished Goods Inventory account. The balance in the Finished Goods Inventory account is the cost of unsold completed product. When the product is sold,

Figure 3
Comparison of Financial
Statements for Service,
Merchandising, and
Manufacturing Organizations



the manufacturing organization calculates the cost of goods sold using the following equation:

$$\text{Cost of Goods Sold} = \begin{array}{c} \text{Beginning} \\ \text{Finished Goods} \\ \text{Inventory} \end{array} + \begin{array}{c} \text{Cost of} \\ \text{Goods} \\ \text{Manufactured} \end{array} - \begin{array}{c} \text{Ending} \\ \text{Finished Goods} \\ \text{Inventory} \end{array}$$

For example, Hatcher Candy Company, a supplier to Sweet Treasures Candy Store, had a balance of \$52,000 in the Finished Goods Inventory account on December 31, 20x2. During the next year, Hatcher manufactured candy products totaling \$144,000. At December 31, 20x3, the Finished Goods Inventory balance was \$78,000. The cost of goods sold is \$118,000 for the period 20x3.

$$\text{Cost of Goods Sold} = \$52,000 + \$144,000 - \$78,000 = \$118,000$$

All of these organizations use the following income statement format:

$$\text{Sales} - \left(\begin{array}{c} \text{Cost of Sales} \\ \text{or} \\ \text{Cost of Goods Sold} \end{array} \right) = \begin{array}{c} \text{Gross} \\ \text{Margin} \end{array} - \begin{array}{c} \text{Operating} \\ \text{Expenses} \end{array} = \text{Net Income}$$

Figure 3 compares the financial statements for service, merchandising, and manufacturing organizations. Note in particular the differences in the inventories and cost of goods sold sections for merchandising and manufacturing organizations. By combining the beginning Merchandise Inventory balance with the net cost of purchases for Sweet Treasures Candy Store, we calculate a “pie” called *cost of goods available for sale*. By counting and valuing unsold merchandise in the Merchandise Inventory account, we slice from the pie the ending Merchandise Inventory balance for the balance sheet, leaving the cost of goods sold for the income statement. Similarly, if we combine the beginning Finished Goods Inventory balance with the cost of goods manufactured for Hatcher Candy Company, we calculate a “pie” called *cost of goods available for sale*. By counting and valuing the unsold products in Finished Goods Inventory, we can slice from the pie the ending Finished Goods Inventory balance for the balance sheet, leaving the cost of goods sold for the income statement. Notice that for service organizations, such as UPS, the “pie” is called *cost of sales*. The cost of sales appears only in the income statement. No portion of it appears on the balance sheet because a service organization has no inventory accounts.

Standards of Ethical Conduct

OBJECTIVE

7 Identify the standards of ethical conduct for management accountants

Managers are responsible to external parties (for example, owners, creditors, governmental agencies, and the local community) for the proper use of organizational resources and the financial reporting of their actions. Conflicts may arise that require managers to balance the interests of all external parties. For example, the community wants a safe living environment, while owners seek to maximize profits. If management decides to purchase an expensive device to extract pollutants from the production process, it will protect the community, but profits will decline. The benefit will be greater for the community than for the owners. On the other hand, management could achieve higher profits for the owners by purchasing a less expensive, less effective pollution device that would protect the community less well. Such potential conflicts between external parties can create ethical dilemmas for management and for accountants.

Management accountants and financial managers have a responsibility to help management balance the needs of the various external parties. Thus the accounting

Exhibit 2**Standards of Ethical Conduct for Practitioners of Management Accounting and Financial Management**

Practitioners of management accounting and financial management have an obligation to the public, their profession, the organization they serve, and themselves, to maintain the highest standards of ethical conduct. In recognition of this obligation, the Institute of Management Accountants has promulgated the following standards of ethical conduct for practitioners of management accounting and financial management. Adherence to these standards, both domestically and internationally, is integral to achieving the Objectives of Management Accounting. Practitioners of management accounting and financial management shall not commit acts contrary to these standards nor shall they condone the commission of such acts by others within their organizations.

Competence. Practitioners of management accounting and financial management have a responsibility to:

- Maintain an appropriate level of professional competence by ongoing development of their knowledge and skills.
- Perform their professional duties in accordance with relevant laws, regulations, and technical standards.
- Prepare complete and clear reports and recommendations after appropriate analysis of relevant and reliable information.

Confidentiality. Practitioners of management accounting and financial management have a responsibility to:

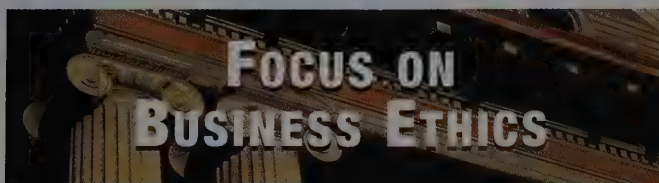
- Refrain from disclosing confidential information acquired in the course of their work except when authorized, unless legally obligated to do so.
- Inform subordinates as appropriate regarding the confidentiality of information acquired in the course of their work and monitor their activities to assure the maintenance of that confidentiality.
- Refrain from using or appearing to use confidential information acquired in the course of their work for unethical or illegal advantage either personally or through third parties.

Integrity. Practitioners of management accounting and financial management have a responsibility to:

- Avoid actual or apparent conflicts of interest and advise all appropriate parties of any potential conflict.
- Refrain from engaging in any activity that would prejudice their ability to carry out their duties ethically.
- Refuse any gift, favor, or hospitality that would influence or would appear to influence their actions.
- Refrain from either actively or passively subverting the attainment of the organization's legitimate and ethical objectives.
- Recognize and communicate professional limitations or other constraints that would preclude responsible judgment or successful performance of an activity.

(continued)

profession must operate with the highest standards of performance. To provide guidance, the Institute of Management Accountants has formally adopted standards of ethical conduct for practitioners of management accounting and financial management. Those standards emphasize that management accountants have responsibilities in the areas of competence, confidentiality, integrity, and objectivity. The full statement is presented in Exhibit 2.



The International Organization for Standardization (ISO) is a worldwide federation of national standards bodies from over 130 countries. It was formed in 1947 to improve the international exchange of goods and ser-

vices and to promote worldwide cooperation in intellectual, scientific, technological, and economic activities. ISO standards are international agreements that guide business. Without the more than 12,000 standards developed by the ISO, businesses would lack guidelines for communicating, measuring, and even producing uniform goods and services. For example, one series of standards, ISO 14000, provides a framework for managing environmental issues.⁶

Exhibit 2**Standards of Ethical Conduct for Practitioners of Management Accounting and Financial Management (continued)**

- Communicate unfavorable as well as favorable information and professional judgments or opinions.
- Refrain from engaging in or supporting any activity that would discredit the profession.

Objectivity. Practitioners of management accounting and financial management have a responsibility to:

- Communicate information fairly and objectively.
- Disclose fully all relevant information that could reasonably be expected to influence an intended user's understanding of the reports, comments, and recommendations presented.

Resolution of Ethical Conflict. In applying the standards of ethical conduct, practitioners of management accounting and financial management may encounter problems in identifying unethical behavior or in resolving an ethical conflict. When faced with significant ethical issues, practitioners of management accounting and financial management should follow the established policies of the organization bearing on the resolution of such conflict. If these policies do not resolve the ethical conflict, such practitioner should consider the following courses of action:

- Discuss such problems with the immediate superior except when it appears that the superior is involved, in which case the problem should be presented initially to the next higher managerial level. If a satis-

factory resolution cannot be achieved when the problem is initially presented, submit the issues to the next higher managerial level.

If the immediate superior is the chief executive officer, or equivalent, the acceptable reviewing authority may be a group such as the audit committee, executive committee, board of directors, board of trustees, or owners. Contact with levels above the immediate superior should be initiated only with the superior's knowledge, assuming the superior is not involved. Except where legally prescribed, communication of such problems to authorities or individuals not employed or engaged by the organization is not considered appropriate.

- Clarify relevant ethical issues by confidential discussion with an objective advisor (e.g., IMA Ethics Counselling Service) to obtain a better understanding of possible courses of action.
- Consult your own attorney as to legal obligations and rights concerning the ethical conflict.
- If the ethical conflict still exists after exhausting all levels of internal review, there may be no other recourse on significant matters than to resign from the organization and to submit an informative memorandum to an appropriate representative of the organization. After resignation, depending on the nature of the ethical conflict, it may also be appropriate to notify other parties.

Source: From *Standards of Ethical Conduct for Practitioners of Management Accounting and Financial Management*. Institute of Management Accountants, July 1997. Reprinted by permission.

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

1. **Define management accounting and distinguish between management accounting and financial accounting.** Management accounting is the process of identifying, measuring, accumulating, analyzing, preparing, interpreting, and communicating information used by management to plan, evaluate, and control an organization and to ensure that its resources are used and accounted for appropriately. Management accounting reports provide information for planning, control, performance measurement, and decision making to employees, managers, and suppliers when they need such information. Management accounting reports follow a flexible format and present subjective, future-oriented information expressed in dollar amounts or physical measures. In contrast, financial accounting reports provide information about the past performance of an organization to owners, lenders, customers, and govern-

ment agencies on a regular basis. Financial accounting reports follow strict guidelines defined by generally accepted accounting principles and present objective information shown in historical dollars.

- 2. Explain the management cycle and its connection to management accounting.** Traditionally, management operates in four stages: planning, executing, reviewing, and reporting. Strategic and operating plans prepare managers for the execution of activities that put those plans into action. A review of actual performance in relation to planned performance helps in the evaluation of management's success in guiding and motivating personnel. Reports reflect the results of planning, executing, and reviewing operations and may be prepared externally for stockholders, creditors, or other external parties or internally for management and employees.
- 3. Identify the management philosophies of continuous improvement and discuss the role of management accounting in implementing those philosophies.** These approaches to management include the just-in-time (JIT) operating environment, total quality management (TQM), activity-based management (ABM), and the theory of constraints (TOC). All of these approaches are designed to achieve continuous improvement by increasing product or service quality, increasing customer satisfaction, reducing resource waste, and reducing cost. Management accounting helps managers design better information systems that are sensitive to changes in production processes in a JIT operating environment, requests for information about quality costs (TQM), the assignment of overhead costs to products or services (ABC), and the identification of process or product constraints (TOC).
- 4. Define performance measures, recognize the uses of those measures in the management cycle, and prepare an analysis of nonfinancial data.** Performance measures are quantitative tools that gauge an organization's performance in relation to a specific goal or expected outcome. Performance measures are used in the management cycle to plan future performance, to guide and motivate current performance and assign costs during the execution stage, and to improve future performance through the analysis of significant differences between actual and planned performance. Management accountants are responsible for analyzing financial and nonfinancial data from a variety of viewpoints. This balanced approach, known as the balanced scorecard, acknowledges the interdependence and differing perspectives of the organization's stakeholders.
- 5. Identify the important questions a manager must consider before requesting or preparing a management report.** Report preparation depends on the four W's: Why? What? Who? and When? The why question is answered by stating the purpose of the report. Once that has been stated, the report maker must determine what information the report should contain to satisfy that purpose. The who question can take several forms: For whom is the report being prepared? To whom should the report be distributed? Who will read it? Finally, there is the question of when. When is the report due?
- 6. Compare accounting for inventories and cost of goods sold in service, merchandising, and manufacturing organizations.** A service organization maintains no inventory accounts. Its cost of sales reflects the net cost of the services sold. A merchandising organization purchases a product that is ready for resale when it is received. Only one account, Merchandise Inventory, is used to record and account for items in inventory. The cost of goods sold is simply the difference between the cost of goods available for sale and the ending merchandise inventory. A manufacturing organization, because

it creates a product, maintains three inventory accounts: Materials Inventory, Work in Process Inventory, and Finished Goods Inventory. Manufacturing costs flow through all three inventory accounts. During the accounting period, the cost of completed products is transferred to the Finished Goods Inventory account; the cost of units that have been sold is transferred to the Cost of Goods Sold account.

7. Identify the standards of ethical conduct for management accountants. Standards of ethical conduct govern management accountants' competence, confidentiality, integrity, and objectivity. These standards help management accountants recognize and avoid situations that could compromise their honesty, loyalty, and ability to supply management with accurate and relevant information.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- L0 3 Activity-based costing (ABC):** A system that identifies all of an organization's major operating activities (both production and nonproduction), traces costs to those activities, and then assigns costs to the products or services that use the resources and services supplied by those activities.
- L0 3 Activity-based management (ABM):** An approach to managing an organization that identifies all major operating activities, determines what resources are consumed by each activity, identifies what causes resource usage of each activity, and categorizes the activities as either adding value to a product or service or not adding value; emphasis is on the reduction or elimination of nonvalue-adding activities.
- L0 4 Balanced scorecard:** A framework that links the perspectives of an organization's stakeholder groups—financial (investors), learning and growth (employees), internal business processes, and customers—with the organization's mission and vision, performance measures, strategic plan, and resources.
- L0 3 Continuous improvement:** The management concept that one should never be satisfied with what is; one should constantly seek a better method, product, service, process, or resource.
- L0 3 Costs of quality:** Both the costs of achieving quality and the costs of poor quality in the manufacture of a product or the delivery of a service.
- L0 3 Just-in-time (JIT) operating philosophy:** A philosophy that requires that all resources, including materials, personnel, and facilities, be acquired and used only as needed; its objectives are to improve productivity and eliminate waste.
- L0 1 Management accounting:** The process of identification, measurement, accumulation, analysis, preparation, interpretation, and communication of financial and non-financial information used by management to plan, evaluate, and control the organization and to assure appropriate use of and accountability for its resources.
- L0 3 Nonvalue-adding activity:** An activity that adds cost to a product or service but does not increase its market value.
- L0 4 Performance measures:** Quantitative tools that gauge an organization's performance in relation to a specific goal or expected outcome.
- L0 3 Theory of constraints (TOC):** A management theory that contends that limiting factors, or bottlenecks, occur during the production of any product or service, and that once managers identify such a constraint, they can focus attention and resources on it and thus achieve significant improvements.
- L0 3 Total quality management (TQM):** A philosophy that requires that all functions work together to build quality into the organization's product or service.
- L0 3 Value-adding activity:** An activity that adds value to a product or service as perceived by the customer.

REVIEW
PROBLEM

LO 4 Youngdale Painting, Inc., is a house-painting company located in Phoenix. The company employs painters specializing in interior walls or exterior trim. Recently Mr. Youngdale assigned two interior painters and three exterior trim painters to two school projects. He prepared a projection of work hours for the Yakima High School and Jerome Elementary School projects for the month of June, as shown below.

Projected Hours to Be Worked					
	Week 1	Week 2	Week 3	Week 4	Totals
Interior	80	80	80	80	320
Exterior	120	120	120	120	480

On July 2, Mr. Youngdale assembled the actual hour data shown below:

Actual Hours Worked					
	Week 1	Week 2	Week 3	Week 4	Totals
Interior	96	108	116	116	436
Exterior	104	108	116	108	436

Mr. Youngdale is concerned about the excess hours worked during June.

REQUIRED

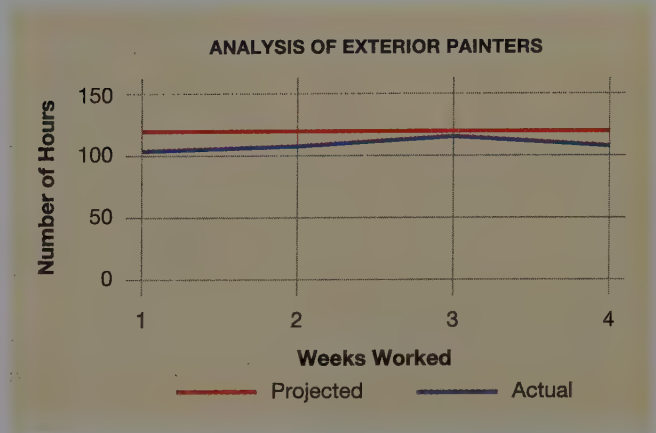
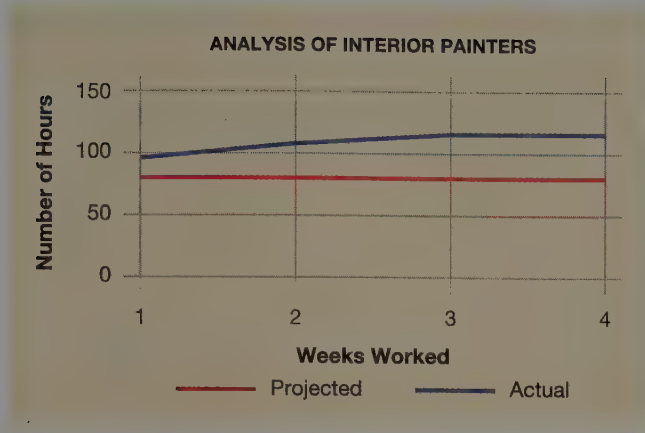
- For each group of painters (interior and exterior), prepare an analysis that shows the projected hours, the actual hours worked, and the number of hours over or under the projected hours for each week and in total.
- Using the same information, prepare one line graph for the interior painters and another line graph for the exterior painters. Place the weeks on the X axis and the number of hours on the Y axis.
- Using the information from 1 and 2, identify which group of painters worked more hours than planned and offer several reasons for the additional hours.

ANSWER TO REVIEW
PROBLEM

1. Interior Painters			
Week	Projected Hours to Be Worked	Actual Hours Worked	Hours Worked Under or (Over) Projected
1	80	96	(16)
2	80	108	(28)
3	80	116	(36)
4	80	116	(36)
Total	320	436	(116)

Exterior Painters			
Week	Projected Hours to Be Worked	Actual Hours Worked	Hours Worked Under or (Over) Projected
1	120	104	16
2	120	108	12
3	120	116	4
4	120	108	12
Total	480	436	44

2.



3. The interior painters took more time to complete the jobs than Mr. Youngdale anticipated. Possible reasons for the additional hours include:
- The quality of the paint or painting materials may have been poor, which would require the walls to be repainted.
 - One of the painters may have been inexperienced or recently hired. If that person lacked training, he or she may have worked more slowly than anticipated, or the other painter may have had to take extra time to train him or her.
 - The customer may have requested a change in color or finish after the painting had started. As a result, the painters may have had to repaint some areas.
 - Mr. Youngdale may have underestimated the time required for interior painting.

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

- What is management accounting?
- How is management accounting similar to financial accounting?
- How do management accounting and financial accounting differ in terms of report format, reasons for report preparation, and the parties to whom management is accountable?
- How do management accounting reports and financial accounting reports differ in terms of units of measure, nature of information, and timing of preparation?
- What are the four stages of the management cycle? Briefly explain each stage.
- How is management accounting linked to the management cycle?
- What management philosophies or approaches have developed in response to global competition?
- How does the just-in-time operating philosophy affect an organization's operating environment?
- How does total quality management help managers do their jobs?
- How does activity-based management affect an organization's operating environment?
- How does the theory of constraints affect an organization's operating environment?
- What are the desired results of adopting any of the management approaches described in this chapter?
- What are performance measures? Give examples of both financial and non-financial performance measures.

14. How are financial and nonfinancial performance measures used?
15. How does the balanced scorecard approach help managers evaluate performance?
16. What perspectives are included in the balanced scorecard?
17. What are the four *Ws* of report preparation? Explain the importance of each.
18. What are the differences between a service organization, a merchandising organization, and a manufacturing organization, and how do the differences affect accounting for inventories?
19. Why are ethical standards of competence so important to the work of management accountants?
20. Why is it so important for management accountants to maintain their integrity?

SHORT EXERCISES

- LO 1 Management Accounting Versus Financial Accounting** **SE 1.** Management accounting differs from financial accounting in a number of ways. Tell whether each of the following characteristics relates to management accounting (MA) or financial accounting (FA).
1. Focuses on various segments of the business entity
 2. Demands objectivity
 3. Relies on the criterion of usefulness rather than formal guidelines or restrictions for gathering information
 4. Measures units in historical dollars
 5. Reports information on a regular basis
 6. Uses only monetary measures for reports
 7. Adheres to generally accepted accounting principles
 8. Prepares reports whenever needed
- LO 2 The Management Cycle** **SE 2.** Indicate whether each of the following management activities is part of the planning stage (P), the executing stage (E), the reviewing stage (REV), or the reporting stage (REP) of the management cycle.
1. Complete a balance sheet and income statement at the end of the year
 2. Train a store clerk to complete a cash sale
 3. Meet with department store managers to develop performance measures for sales personnel
 4. Rent a local warehouse to store excess inventory of clothing
 5. Evaluate the performance of the shoe department by examining the significant differences between the department's actual and planned expenses for the month
 6. Prepare an annual budget of anticipated sales for each department and the entire store
- LO 3 JIT and Continuous Improvement** **SE 3.** The just-in-time operating environment focuses on reducing or eliminating the waste of resources. Resources include physical assets such as machinery and buildings, labor time, and materials and parts used in the production process. Choose one of those resources and tell how it could be wasted. How can an organization prevent the waste of that resource? How can the concept of continuous improvement be implemented to reduce the waste of that resource?
- LO 3 ABC and the Assignment of Cost** **SE 4.** Spring Break Enterprises offers weeklong Florida vacation packages to student groups. The trip includes meals, lodging, a parasailing excursion, and transportation. The price is \$1,400 per couple. Courtney and Chris sign up. What are some ways of assigning the cost of the trip to each of them? Support your answer.
- LO 4 Analysis of Nonfinancial Data** **SE 5.** Spectrum Technologies has been having a problem with the computerized welding operation in its dialogic extractor product line. The extractors are used to sift through various types of metal shavings and separate them into piles of individual metals for recycling and scrap sales. The time for each welding operation has been increasing at an erratic rate. Management has asked that the time intervals be analyzed to see if the cause of the problem can be determined. The number of parts welded per shift during the previous week is reported at the top of the next page. What can you deduce from the information that may help management solve the welding operation problem?

	Machine Number	Monday	Tuesday	Wednesday	Thursday	Friday
First shift:						
Kovacs	1	642	636	625	617	602
Abington	2	732	736	735	729	738
Geisler	3	745	726	717	694	686
Second shift:						
Deragon	1	426	416	410	404	398
Berwager	2	654	656	661	664	670
Grass	3	526	524	510	504	502

LO 4 **Balanced Scorecard—
Stakeholder Values**

SE 6. In the balanced scorecard approach, indicate which stakeholder's perspective values each of the performance goals below: financial (F), learning and growth (L), internal business processes (P), or customers (C). Some may have more than one perspective.

1. High wages
2. Safe products
3. Low-priced products
4. Improved return on investment
5. Job security
6. Cost-effective production processes

LO 5 **Managerial Report
Preparation**

SE 7. Melissa Mertz, president of Mertz Industries, asked controller Rick Caputo to prepare a report on the use of electricity by each of the organization's five divisions. Increases in electricity costs in the divisions ranged from 20 to 35 percent over the past year. What questions should Rick ask before he begins his analysis?

LO 6 **Service, Merchandising, or
Manufacturing**

SE 8. Based on the following information, decide whether Vikram Company is a service, merchandising, or manufacturing organization. List reasons for your answer.

Beginning Work in Process Inventory	\$3,800
Materials Used	2,350
Overhead Costs	4,250
Direct Labor Costs	1,500
Cost of Goods Sold	9,340
Ending Materials Inventory	2,430
Beginning Finished Goods Inventory	4,800
Ending Finished Goods Inventory	7,250

LO 6 **Comparing Income
Statement Formats**

SE 9. Indicate whether each of these equations applies to a service organization (SER), merchandising organization (MER), or manufacturing organization (MANF):

1. $\text{Cost of Goods Sold} = \text{Beginning Merchandise Inventory} + \text{Net Cost of Purchases} - \text{Ending Merchandise Inventory}$
2. $\text{Cost of Sales} = \text{Net Cost of Services Sold}$
3. $\text{Cost of Goods Sold} = \text{Beginning Finished Goods Inventory} + \text{Cost of Goods Manufactured} - \text{Ending Finished Goods Inventory}$

LO 7 **Ethical Conduct**

SE 10. Gary Louskip, a management accountant for Pegstone Cosmetics Company, has lunch every day with his friend Joe Blaik, a management accountant for Shepherd Cosmetics, Inc., a competitor of Pegstone. Last week, Louskip couldn't decide how to treat some information in a report he was preparing, so he discussed it with Blaik. Is Louskip adhering to the ethical standards of management accountants? Defend your answer.

EXERCISES

LO 1 **Financial and Management
Accounting**

E 1. Explain this statement: "It is impossible to distinguish the point at which financial accounting ends and management accounting begins."

LO 2 **The Management Cycle**

E 2. Indicate whether each of the following management activities is part of the planning stage (P), the executing stage (E), the reviewing stage (REV), or the reporting stage (REP) of the management cycle in a local hospital.

1. Lease five Ford ambulances for the current year
2. Compare the actual number of patient days in the hospital to the planned number of patient days for the year

3. Develop a strategic plan for a new pediatric wing of the hospital
4. Prepare a report showing the past performance of the emergency room
5. Develop standards, or expectations, for the performance of the hospital admittance area for the next year
6. Prepare and distribute the hospital's balance sheet and income statement to the board of directors
7. Maintain an inventory of bed linens and bath towels for hospital patients
8. Formulate a corporate policy for the treatment and final disposition of hazardous waste materials in the hospital
9. Prepare a report of the types and amounts of hazardous waste materials removed from the hospital in the last three months
10. Record the time taken to deliver food trays to patients staying in the hospital

LO 3 Management Philosophies

- E 3.** Recently, you were dining with four chief financial officers who were attending a seminar on management tools and approaches to improving operations. During dinner, they shared information about their organizations' current operating environments. Excerpts from the dinner conversation are presented below. Tell whether each excerpt describes activity-based management (ABM), just-in-time operations (JIT), total quality management (TQM), or theory of constraints (TOC).

CFO 1: We believe that quality can be achieved through carefully designed production processes. Therefore, we have an environment in which the time to move, store, queue, and inspect materials and products is greatly reduced. We have reduced inventories by purchasing and using materials only as needed.

CFO 2: Your approach is good. However, we are more concerned with our total operating environment, so we have a strategy that asks all employees to contribute to the achievement of quality, both for our products and for our production processes. We focus on eliminating poor product quality by reducing waste and inefficiencies in our current operating methods.

CFO 3: Our organization has adopted a strategy for quality products that incorporates many of your approaches. We also want to manage our resources effectively, but we do so by monitoring operating activities. All activities are analyzed, and the ones that do not add value to products are reduced or eliminated.

CFO 4: All of your approaches are good, but how do you set priorities for your management efforts? We find that if we focus our time and resources on the bottlenecks in our production processes, we achieve the greatest improvements.

LO 3 TQM and Value

- E 4.** Garcia Dry Cleaners recently adopted total quality management. Juan Garcia, the owner, has hired you as a consultant. Classify each of the following activities as either value-adding (V) or nonvalue-adding (NV).

- | | |
|-----------------------------|------------------------------|
| 1. Same-day service | 4. Seamstress on site |
| 2. Store closed on weekends | 5. Customers pay for parking |
| 3. Free delivery service | |

LO 4 Nonfinancial Data Analysis

- E 5.** Sculpted Lawns, Inc., specializes in lawn installations requiring California bluegrass sod. The sod comes in 1-yard squares. The organization uses the guideline of 500 square yards per person per hour to evaluate the performance of its sod layers.

During the first week of March, the following actual data were collected.

Employee	Hours Worked	Square Yards of Sod Planted
S. Elway	38	18,240
R. Mahoney	45	22,500
N. Fencereaux	40	19,800
O. Pfister	42	17,640
B. Onski	44	22,880
J. Mantero	45	21,500

Evaluate the performance of the six employees.

L0 4 Using Nonfinancial Data

- E 6.** Better Cookie Company recently adopted TQM for manufacturing its cookies. According to a quality performance measure set by Elián Gomez, the TQM vice president working with production, no more than 10 cookies should be rejected per day. Data gathered for a recent week showed that the actual number of rejected cookies was as follows.

Day	Actual Number of Rejected Cookies
Monday	5
Tuesday	6
Wednesday	7
Thursday	4
Friday	8
Total	<u>30</u>

Analyze the activity for the week by preparing a table showing each day's maximum number of rejected cookies allowed, actual number of rejected cookies, and variance under (over) the maximum number allowed. Compute the daily average for each column (maximum number of rejected cookies allowed, actual number of rejected cookies, and variance under [over] the maximum number allowed each day). Based on the information in the table, how successful was Gomez in increasing the quality of cookies made at Better Cookie Company?

L0 4 Nonfinancial Data Analysis

- E 7.** Jon Bentley, the Information Technology Officer of Muse Corporation, must decide whether to purchase additional memory for existing computers or buy additional new computers to increase his department's productivity. Six weeks ago Bentley installed additional memory on Computer CM. Bentley is impressed with the processing improvement, but he has yet to decide between the two courses of action. Information on the number of bytes processed per nanosecond by each computer for the past ten weeks is summarized below.

Computer	Weeks									
	One	Two	Three	Four	Five	Six	Seven	Eight	Nine	Ten
CM	51	52	53	50	80	82	84	87	88	89
CN	52	51	52	52	54	54	53	54	54	54
CP	50	49	50	48	50	52	51	50	52	50

Bentley has asked you to analyze the two courses of action based on the assumption that two memory upgrades can be purchased for the price of one new computer. Your analysis is to include the computation of the average weekly output per nanosecond for computers CN and CP, a comparison of that average with the output of computer CM, and the computation of the weekly difference between the average output and the output of computer CM. What course of action do you recommend?

L0 5 Report Preparation

- E 8.** Walter Han is the sales manager for Sunny Days Greeting Cards, Inc. At the beginning of the year, the organization introduced a new line of humorous birthday cards into the U.S. market. Now management is holding a strategic planning meeting to plan next year's operating activities. One item on the agenda is to review the success of the new birthday card line and decide if there is a need to change the selling price or to stimulate sales volume in the five sales territories. For the August 31 meeting, Han is asked to prepare a report addressing those issues. His report is to include profits generated in each sales territory for the birthday card line only.

On August 31 Han arrived at the meeting late and immediately distributed his report to the members of the strategic planning team. The report consisted of comments made by seven of Han's leading sales representatives. The comments were broad in scope and touched only lightly on the success of the new card line. Han was pleased that he had met the deadline to distribute the report, but the other team members were disappointed in the information he had provided.

Using the four W's for report presentation, comment on Han's effectiveness in preparing a report for the strategic planning team.

- LO 6 Service, Merchandising, or Manufacturing**
- E 9.** Indicate whether the accounting information from each of the following accounts refers to the operations of a service organization (SER), a merchandising organization (MER), or a manufacturing organization (MANF). Some may refer to more than one kind of organization.
- | | |
|-----------------------------|-------------------------------|
| 1. Finished Goods Inventory | 6. Cost of Goods Manufactured |
| 2. Merchandise Inventory | 7. Gross Margin |
| 3. Cost of Goods Sold | 8. Net Income |
| 4. Net Cost of Purchases | 9. Operating Expenses |
| 5. Materials Inventory | 10. Cost of Sales |
- LO 6 Characteristics of Organizations**
- E 10.** Indicate whether each of the following characteristics is typical of a service organization (SER), a merchandising organization (MER), or a manufacturing organization (MANF).
- Maintains only one balance sheet inventory account
 - Maintains no balance sheet inventory accounts
 - Maintains three balance sheet inventory accounts
 - Purchases products ready for resale
 - Designs and manufactures products for sale
 - Sells services
 - Determines the cost of sales
 - Includes the cost of goods manufactured in calculating cost of goods sold
 - Includes the cost of purchases in calculating cost of goods sold
- LO 6 Missing Amounts—Manufacturing**
- E 11.** Presented below are the incomplete inventory and income statement data for Trevor Corporation. Determine the missing amounts.
- | | Cost of
Goods Sold | Cost of
Goods
Manufactured | Beginning
Finished
Goods
Inventory | Ending
Finished
Goods
Inventory |
|----|-----------------------|----------------------------------|---|--|
| 1. | \$ 10,000 | \$12,000 | \$ 1,000 | ? |
| 2. | \$140,000 | ? | \$45,000 | \$60,000 |
| 3. | ? | \$89,000 | \$23,000 | \$20,000 |
- LO 6 Missing Amounts—Merchandising**
- E 12.** Presented below are incomplete inventory and income statement data for Justin Corporation. Determine the missing amounts.
- | | Beginning
Merchandise
Inventory | Ending
Merchandise
Inventory | Net Cost
of
Purchases | Cost of
Goods
Sold |
|----|---------------------------------------|------------------------------------|-----------------------------|--------------------------|
| 1. | \$ 5,000 | \$ 8,000 | \$ 15,000 | ? |
| 2. | ? | \$40,000 | \$133,000 | \$120,000 |
| 3. | \$32,000 | \$47,000 | ? | \$ 81,000 |
- LO 6 Missing Amounts—Income Statement**
- E 13.** Presented below are incomplete income statement data for Donatello Corporation. Determine the missing amounts.
- | | Sales | Cost of
Goods Sold | Gross
Margin | Operating
Expenses | Net
Income |
|----|----------|-----------------------|-----------------|-----------------------|---------------|
| 1. | \$10,000 | \$ 2,000 | \$ 8,000 | \$ 6,000 | ? |
| 2. | ? | \$60,000 | \$80,000 | \$59,000 | \$21,000 |
| 3. | \$88,000 | ? | \$31,000 | \$11,000 | \$20,000 |
- LO 6 Missing Amounts—Income Statement**
- E 14.** Presented below are incomplete income statement data for Yardley Services, Inc. Determine the missing amounts.
- | | Sales | Cost of
Sales | Gross
Margin | Operating
Expenses | Net
Income |
|----|-----------|------------------|-----------------|-----------------------|---------------|
| 1. | \$ 15,000 | \$ 8,000 | \$ 7,000 | \$ 4,000 | ? |
| 2. | \$150,000 | \$100,000 | \$50,000 | ? | \$6,000 |
| 3. | \$ 90,000 | \$ 70,000 | ? | \$15,000 | \$5,000 |

LO 7 Professional Ethics

- E 15.** Lisa Gedrun went to work for Billings Industries five years ago. She was recently promoted to cost accounting manager and now has a new boss, Vic Howard, the corporate controller. Last week, Gedrun and Howard went to a two-day professional development program on accounting changes in the new manufacturing environment. During the first hour of the first day's program, Howard disappeared and Gedrun didn't see him again until the cocktail hour. The same thing happened on the second day. During the trip home, Gedrun asked Howard if he had enjoyed the conference. He replied:

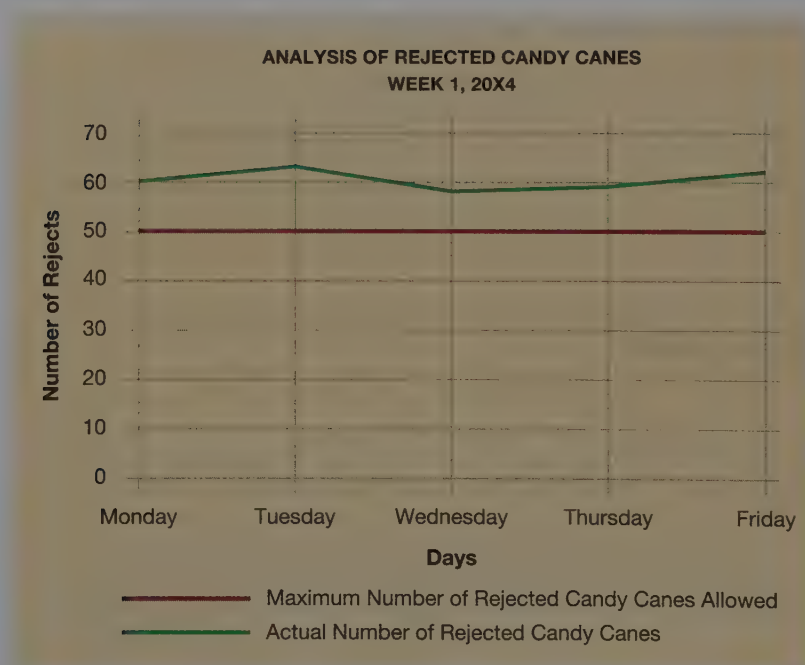
Lisa, the golf course was excellent. You play golf. Why don't you join me during the next conference? I haven't sat in on one of those sessions in ten years. This is my R&R time. Those sessions are for the new people. My experience is enough to keep me current. Plus, I have excellent people to help me as we adjust our accounting system to the changes being implemented on the production floor.

Does Lisa Gedrun have an ethical dilemma? If so, what is it? What are her options? How would you solve her problem? Be prepared to defend your answer.

PROBLEMS**LO 4 Using Nonfinancial Data**

- P 1.** Ideal Candy Company recently developed its strategic plan based on the philosophy of total quality management. Ideal wants to sell candies with the highest quality in terms of color, texture, shape, and taste. To meet quality standards, management chose many quality performance measures, including the number of rejected candy canes. Working with Luisa Ortes, the process supervisor, management decided that no more than 50 candy canes should be rejected daily during the year. Using data on rejections in Week 1 of 20x4, Ortes prepared the following summary and graph.

Week 1, 20x4	Maximum Number of Rejected Candy Canes Allowed	Actual Number of Rejected Candy Canes	Variance Under (Over) Allowed Maximum
Monday	50	60	(10)
Tuesday	50	63	(13)
Wednesday	50	58	(8)
Thursday	50	59	(9)
Friday	50	62	(12)
Total for the Week	250	302	(52)
Daily Average	50	60.4	



Because the variance was 20.8 percent ($52 \div 250$), Ortes decided to analyze the data further. She found that the rejected candy canes either contained too little sugar (ingredients), were not circular in shape (shaping), or were undercooked (cooking time). The number of rejects in each category appears below.

Week 1, 20x4	Reasons for Rejects
Ingredients	40
Shaping	195
Cooking Time	67
Total	<u>302</u>

Ortes worked with the cooks the following week to review the recipe, including ingredients, quantities, and cooking instructions. She trained the cooks to measure quantities more precisely, to shape the candy more carefully, and to time the cooking process more accurately. Then, in Week 3 of 20x4, she gathered the following information on the actual number of rejected candy canes and reasons for the rejects.

Week 3, 20x4	Actual Number of Rejects
Monday	20
Tuesday	21
Wednesday	22
Thursday	19
Friday	18
Total	<u>100</u>

Week 3, 20x4	Reasons for Rejects
Ingredients	7
Shaping	63
Cooking Time	30
Total	<u>100</u>

REQUIRED

1. Analyze the activity in Week 3 of 20x4 by preparing a table showing each day's maximum number of rejected candy canes allowed (50 candy canes), actual number of rejected candy canes, and variance under (over) the maximum number allowed. In addition, prepare a graph comparing the maximum and actual numbers of rejected candy canes each day for Week 3.
2. Analyze the change in reasons for rejects between Weeks 1 and 3 by preparing a table showing the frequency of each reason for rejecting a candy cane for each week. In addition, prepare a graph comparing the reasons for each week.
3. Based on the information, how successful was Ortes in increasing the quality of the candy canes made at Ideal? What recommendations, if any, would you make about monitoring the candy production process in the future?

LO 4 Nonfinancial Data Analysis: Bank



- P 2.** Colbert State Bank was founded in 1869. It has had a record of slow, steady growth since its inception. Management has always kept the processing of information as current as technology allows. Leslie Oistins, manager of the Paynes Bay branch, is upgrading the check-sorting equipment in her office. There are ten check-sorting machines in operation. Information on the number of checks sorted by machine for the past eight weeks is summarized at the top of the next page.

The Paynes Bay branch has increased its checking business significantly over the past two years. Oistins must decide whether to purchase additional check-sorting machines or attachments for the existing machines to increase productivity. Five weeks ago the Colonnade Company convinced her to experiment with one such attachment, and it was placed on Machine BD. Oistins is impressed with the attachment but has yet to decide between the two courses of action. Labor costs are not a factor in her decision.

Machine	Weeks							
	One	Two	Three	Four	Five	Six	Seven	Eight
AA	89,260	89,439	89,394	90,288	90,739	90,658	90,676	90,630
AB	91,420	91,237	91,602	91,969	91,950	92,502	92,446	92,816
AC	94,830	95,020	94,972	95,922	96,401	96,315	96,334	96,286
AD	91,970	91,786	92,153	92,522	92,503	93,058	93,002	93,375
AE	87,270	87,445	87,401	88,275	88,716	88,636	88,654	88,610
BA	92,450	92,265	92,634	93,005	92,986	93,544	93,488	93,862
BB	91,910	92,094	92,048	92,968	93,433	93,349	93,368	93,321
BC	90,040	89,860	90,219	90,580	90,562	91,105	91,051	91,415
BD	87,110	87,190	87,210	130,815	132,320	133,560	134,290	135,770
BE	94,330	94,519	94,471	95,416	95,893	95,807	95,826	95,778

REQUIRED

1. Compute the average weekly output of all machines except BD without the new attachment.
2. Compare the average weekly output of Machine BD with the average weekly output of the nine machines without the attachment. Compute the weekly difference in the number of checks and the percentage change (difference divided by the average weekly output of the nine machines combined).
3. Assume the Colonnade Company attachment costs about the same as a new check-sorting machine. Which alternative should Oistins choose?
4. Would you change your recommendation if two attachments could be purchased for the price of one check-sorting machine? Are more data needed?
5. Assume three attachments could be purchased for the price of one check-sorting machine. What action would you recommend?

LO 5 Approach to Report Preparation

- P 3.** Ben Sanji recently purchased Rakes Etc., Inc., a wholesale distributor of lawn- and garden-care equipment and supplies. The organization, headquartered in Baltimore, Maryland, has four distribution centers: Boston, Massachusetts; Rye, New York; Reston, Virginia; and Lawrenceville, New Jersey. The distribution centers service 14 eastern states. Company profits were \$225,400, \$337,980, and \$467,200 for 20x2, 20x3, and 20x4, respectively.

Shortly after purchasing the organization, Sanji appointed people to fill the following positions: vice president, marketing; vice president, distribution; corporate controller; and vice president research and development. Sanji has called a meeting of his management group. He wishes to create a deluxe retail lawn and garden center that would include a large, fully landscaped plant and tree nursery. The purposes of the retail center would be (1) to test equipment and supplies before selecting them for sales and distribution and (2) to showcase the effects of using the company's products. The retail center must also make a profit on sales.

REQUIRED

1. What types of information will Sanji need before deciding whether to create the retail lawn and garden center?
2. One of the reports Sanji needs in order to support his decision is an analysis of all possible plants and trees that could be planted and their ability to grow in the possible locations for the new retail center. The report would be prepared by the vice president of research and development. How would each of the four Ws pertain to this report?
3. Design a format for the report in 2.

LO 6 Manufacturing Organization Balance Sheet

- P 4.** The analysis at the top of the next page shows the balance sheet accounts at Rozicki Manufacturing Company after closing entries were made.

REQUIRED

1. Manufacturing organizations use asset accounts that are not needed by merchandising organizations.
 - a. List the titles of the asset accounts that are specifically related to manufacturing organizations.

Ledger Accounts	Debit	Credit
Cash	\$ 34,000	
Accounts Receivable	27,000	
Materials Inventory, 12/31/x6	31,000	
Work in Process Inventory, 12/31/x6	47,900	
Finished Goods Inventory, 12/31/x6	54,800	
Production Supplies	5,700	
Small Tools	9,330	
Land	160,000	
Factory Building	575,000	
Accumulated Depreciation, Building		\$ 199,000
Factory Equipment	310,000	
Accumulated Depreciation, Factory Equipment		137,000
Patents	33,500	
Accounts Payable		26,900
Insurance Premiums Payable		6,700
Income Taxes Payable		41,500
Mortgage Payable		343,000
Common Stock		200,000
Retained Earnings, 12/31/x6		334,130
	<u>\$1,288,230</u>	<u>\$1,288,230</u>

- b. List the titles of the asset, liability, and equity accounts that you would see on the balance sheets of both manufacturing and merchandising organizations.
2. Assuming that the following information reflects the results of operations for 20x6, calculate the (a) gross margin, (b) cost of goods sold, (c) cost of goods available for sale, and (d) cost of goods manufactured.

Net Income	\$138,130
Operating Expenses	53,670
Sales	500,000
Finished Goods Inventory, 12/31/x5	50,900

- LO 6 Inventories, Cost of Goods Sold, and Net Income**
- P 5.** The following analyses contain incomplete data for (1) a merchandising organization and (2) a manufacturing organization.

REQUIRED



1. Fill in the missing data for the merchandising organization.

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Sales	\$9	\$ e	\$15	\$ k
Gross Margin	a	4	5	l
Ending Merchandise Inventory	5	f	5	m
Beginning Merchandise Inventory	4	g	h	5
Net Cost of Purchases	b	7	9	n
Net Income	3	2	i	2
Operating Expenses	c	2	2	4
Cost of Goods Sold	5	6	j	11
Cost of Goods Available for Sale	d	12	15	15

2. Fill in the missing data on the next page for the manufacturing organization.

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Ending Finished Goods Inventory	\$a	\$ 3	\$ h	\$ 6
Cost of Goods Sold	6	3	5	1
Net Income	1	3	1	m
Cost of Goods Available for Sale	8	d	10	13
Cost of Goods Manufactured	5	e	i	8
Gross Margin	4	f	j	7
Operating Expenses	3	g	5	6
Beginning Finished Goods Inventory	b	2	3	n
Sales	c	10	k	14

ALTERNATE PROBLEMS

P 6.

LO 4 Nonfinancial Data Analysis:
Manufacturing



Wave Surfboards, Inc., manufactures state-of-the-art surfboards and related equipment. Lindy Raymond is the manager of the West Indies branch. The production process involves the following departments and tasks: (1) the Molding Department, where the board's base is molded; (2) the Sanding Department, where the base is sanded after being taken out of the mold; (3) the Fiber-Ap Department, where a fiberglass coating is applied; and (4) the Finishing Department, where a finishing coat of fiberglass is applied and the board is inspected. After the molding process, all functions are performed by hand.

Raymond is concerned about the hours being worked by her employees. The West Indies branch utilizes a two-shift labor force. The actual hours worked for the past four weeks are summarized below.

Actual Hours Worked—First Shift					
Department	Week 1	Week 2	Week 3	Week 4	Totals
Molding	420	432	476	494	1,822
Sanding	60	81	70	91	302
Fiber-Ap	504	540	588	572	2,204
Finishing	768	891	952	832	3,443

Actual Hours Worked—Second Shift					
Department	Week 1	Week 2	Week 3	Week 4	Totals
Molding	360	357	437	462	1,616
Sanding	60	84	69	99	312
Fiber-Ap	440	462	529	506	1,937
Finishing	670	714	782	726	2,892

Expected labor hours per product for each operation are: Molding, 3.4 hours; Sanding, .5 hour; Fiber-Ap, 4.0 hours; and Finishing, 6.5 hours. Actual units completed were as follows:

Week	First Shift	Second Shift
1	120	100
2	135	105
3	140	115
4	130	110

REQUIRED

1. Prepare an analysis of each week to determine the average actual labor hours worked per board for each phase of the production process and for each shift. Carry your solution to two decimal places.

2. Using the information from 1 and the expected labor hours per board for each department, prepare an analysis showing the differences in each phase of each shift. Identify possible reasons for the differences.

LO 5 Approach to Report Preparation



- P 7.** Goodfit Industries, Inc., is deciding whether to expand its Shirts by Olene line of women's clothing. Sales in units of this product were 22,500, 28,900, and 36,200 in 20x1, 20x2, and 20x3, respectively. The product has been very profitable, averaging 35 percent profit (above cost) over the three-year period. Goodfit has ten sales representatives covering seven states in the Northeast. Present production capacity is about 40,000 shirts per year. There is adequate plant space for additional equipment, and the labor needed can be easily hired and trained.

The organization's management is made up of four vice presidents: the vice president of marketing, the vice president of production, the vice president of finance, and the vice president of management information systems. Each vice president is directly responsible to the president, Olene Good.

REQUIRED

1. What types of information will Good need before she can decide whether to expand the Shirts by Olene product line?
2. Assume that one of the reports needed to support Good's decision is an analysis of sales over the past three years. This analysis should be broken down by sales representative. How would each of the four *W*s pertain to this report?
3. Design a format for the report in 2.

LO 6 Manufacturing Company Balance Sheet



- P 8.** The analysis below shows the balance sheet accounts at Whitten Manufacturing Company after closing entries were made.

Ledger Accounts	Debit	Credit
Cash	\$ 26,000	
Accounts Receivable	30,000	
Materials Inventory, 12/31/x5	42,000	
Work in Process Inventory, 12/31/x5	27,400	
Finished Goods Inventory, 12/31/x5	52,700	
Production Supplies and Tools	8,600	
Land	200,000	
Factory Building	400,000	
Accumulated Depreciation, Building		\$ 110,000
Factory Equipment	250,000	
Accumulated Depreciation, Equipment		72,000
Sales Warehouse	148,000	
Accumulated Depreciation, Warehouse		35,000
Patents	27,300	
Accounts Payable		101,800
Mortgage Payable		400,000
Common Stock		260,000
Retained Earnings, 12/31/x5		233,200
	<u>\$1,212,000</u>	<u>\$1,212,000</u>

REQUIRED

1. Manufacturing organizations use asset accounts that are not needed in merchandising organizations.
 - a. List the titles of the asset accounts that are specifically related to manufacturing organizations.
 - b. List the titles of the asset, liability, and equity accounts that you would see on the balance sheets of both manufacturing and merchandising organizations.

2. Assuming that the following information reflects the results of operations for 20x5, calculate the (a) gross margin, (b) cost of goods sold, (c) cost of goods available for sale, and (d) cost of goods manufactured.

Net Income	\$133,200
Operating Expenses	48,000
Sales	450,000
Finished Goods Inventory 12/31/x4	68,000

EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

- SD 1.** Achieving high quality requires high standards of performance. To maintain high standards of quality, individuals and organizations must continuously improve their performance. To illustrate this, select your favorite sport or hobby.

- Answer the following questions:
 - What standards would you establish to assess your actual performance?
 - What process would you design to achieve high quality in your performance?
 - When do you know you have achieved high quality in your performance?
 - Once you know you perform well, how easy would it be for you to maintain that level of expertise?
 - What can you do to continuously improve your performance?
- If you owned a business, which of the questions in 1 would be important to answer?
- Answer the questions in 1, assuming you own a business.

- SD 2.** According to *The Wall Street Journal*, **General Motors Corp.** apparently retreated from its plan to revamp the way it makes small cars. Called Project Yellowstone, the plan called for GM to build two U.S. plants that would use modular assembly systems. GM's suppliers would develop and supply large chunks of cars, like dashboards, to those plants for final assembly. The amount of GM's investment and the number of employees needed to assemble the cars would be greatly reduced. The United Auto Workers union blasted the new approach as an attempt to eliminate union jobs.⁷

- What financial performance measures mentioned in the chapter would have prompted GM's desire to try a new approach?
- The balanced scorecard uses performance measures that link to the perspectives of all stakeholder groups. Who are GM's stakeholders, and what performance measures do they value?
- Refer to the discussion of Honda Motor Co. in the Decision Point at the beginning of this chapter. How does GM's modular assembly plan differ from Honda's?
- In your opinion, what options does GM have if it wishes to pursue the use of modular assembly systems?

LO 3 Continuous Improvement



LO 4 Performance Measures



Communication



Critical Thinking



Ethics



Group Activity



Hot Links to Real Companies



International



Internet



Memo



Spreadsheet

LO 7 Professional Ethics



Ethical Dilemma

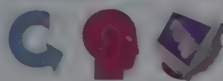
- SD 3.** Grace Albems is the controller for the *Atlanta Corporation*. Albems has been with the company for 17 years and is being considered for the job of chief financial officer (CFO). Her boss, the current CFO and former company controller, will be Atlanta Corporation's new president. Albems has just discussed the year-end closing with her boss, who made the following statement during the conversation:

Grace, why are you so inflexible? I'm only asking you to postpone the write-off of the \$2,500,000 obsolete inventory for ten days so that it won't appear on this year's financial statements. Ten days! Do it. Your promotion is coming up, you know. Make sure you keep all the possible outcomes in mind as you complete your year-end work. Oh, and keep this conversation confidential—just between you and me. OK?

Identify the ethical issue or issues involved and state the appropriate solution to the problem. Be prepared to defend your answer.

Research Activity

LO 5 Management Reports

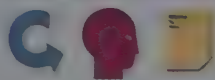


- SD 4.** The registrar's office of *Swink County College* is responsible for maintaining a record of each student's grades and credits for use by students, instructors, and administrators.

1. Assume that you are a manager in the registrar's office and that you recently joined a team of managers to review the grade-reporting process. State how you would prepare a grade report for students and a grade report for instructors by answering the following questions.
 - a. Who will read the grade report?
 - b. Why must the registrar's office prepare the grade report?
 - c. What information should the grade report contain?
 - d. When is the grade report due?
2. Why do differences exist between the information in a grade report for students and the information in a grade report for instructors?
3. Visit the registrar's office of your school in person, or access it through your school's home page. Obtain a copy of your grade report and a copy of the forms the registrar's office uses to report grades to instructors at your school. Compare the information on the actual grade report forms to the information you listed in 1 above. Explain any differences.
4. What can the registrar's office do to make sure that grade reports present all necessary information in a manner that communicates effectively to users?

Decision-Making Practice

LO 4 Nonfinancial Data Analysis



- SD 5.** As a subcontractor in the jet aircraft industry, *Air Gears Manufacturing Company* specializes in the production of housings for landing gears on jet airplanes. Production begins on Machine 1, which bends pieces of metal into cylinder-shaped housings and trims off the rough edges. Machine 2 welds the seam of the cylinder and pushes the entire piece into a large die to mold the housing into its final shape.

Joe Mee, the production supervisor, believes that too much scrap (wasted metal) is created in the current process. To help him, James Kincaid began preparing an analysis by comparing the amounts of actual scrap generated with the amounts of expected scrap for production in the last four weeks. His incomplete report appears at the top of the next page. Because of a death in his family, Kincaid cannot complete the analysis. Mee asks you to complete the following tasks and submit a recommendation to him.

1. Present the information in two ways.
 - a. Prepare a table that shows the difference between the actual and the expected scrap in pounds per machine per week. Calculate the difference in pounds and as a percentage (divide the difference in pounds by the expected pounds of scrap

Air Gears Manufacturing Company
Comparison of Actual Scrap and Expected Scrap
Four-Week Period

	Scrap in Pounds		Difference	
	Actual	Expected	Pounds	Percentage
Machine 1				
Week 1	36,720	36,720		
Week 2	54,288	36,288		
Week 3	71,856	35,856		
Week 4	82,440	35,640		
Machine 2				
Week 1	43,200	18,180		
Week 2	39,600	18,054		
Week 3	7,200	18,162		
Week 4	18,000	18,108		

for each week). If the actual poundage of scrap is less than the expected poundage, record the difference as a negative. (This means there is less scrap than expected.)

- b. Prepare a line graph for each machine showing the weeks on the X axis and the pounds of scrap on the Y axis.
2. Examine the differences for the four weeks for each machine and determine which machine operation is creating excessive scrap.
3. What could be causing this problem?
4. What could Mee do to identify the specific cause of such problems sooner?
5. Write a memo summarizing your findings in 1 through 4 above.

MANAGERIAL REPORTING AND ANALYSIS

Interpreting Management Reports

MRA 1.

LO 1 Management Information



Obtain a copy of a recent annual report for a publicly held organization in which you have a particular interest. (Copies of annual reports are available at your campus library, at a local public library, on the Internet, or by direct request to an organization.) Assume that you have just been appointed to a middle-management position in a division of the organization you have chosen. You are interested in obtaining information that will help you better manage the activities of your division and have decided to thoroughly review the contents of the annual report in an attempt to learn as much as possible. You particularly want to know about:

1. Size of inventory maintained
2. Ability to earn income
3. Reliance on debt financing
4. Types, volume, and prices of products or services sold
5. Type of production process used
6. Management's long-range strategies
7. Success (profitability) of the division's various product lines
8. Efficiency of operations
9. Operating details of your division

REQUIRED

1. Write a brief description of the organization and its products, services, or activities.
2. From a review of the financial statements and the accompanying disclosure notes, prepare a written summary of the information you found that pertained to items 1 through 9 above.
3. Is any of the information you seek in other sections of the annual report? If so, which information, and where is it found?
4. The annual report also includes other types of information you may find helpful in your new position. In outline form, summarize the additional information you think will help you.

Formulating Management Reports

MRA 2.

LO 5 Management Information Needs

REQUIRED



In MRA 1, you examined your new employer's annual report and noted some useful information. You still wish to find out if your new division's products are competitive, but you cannot find the necessary information in the annual report.

1. What kinds of information do you want to know about your competition?
2. Why is this information relevant? (Link your response to a particular decision about your organization's products or services. For example, you might seek information to help you determine a new selling price.)
3. From what sources could you obtain the information you need?
4. When would you want to obtain this information?
5. Create a report that will communicate your findings to your superior.

International Company

MRA 3.

LO 4 Management Information Needs



McDonald's is the leading competitor in the fast-food restaurant business. More than 40 percent of McDonald's restaurants are located outside the United States. One component of McDonald's marketing strategy is to increase sales by expanding its foreign markets. The company uses quantitative and qualitative financial and nonfinancial information in making decisions about new restaurant locations in foreign markets. For example, the following types of information would be important to such a decision: the cost of a new building (financial quantitative information), the estimated number of hamburgers to be sold in the first year (nonfinancial quantitative information), and site desirability (qualitative information).

REQUIRED

You are a member of a management team that must decide whether or not to open a new restaurant in England. Identify at least two examples each of the (a) financial quantitative, (b) nonfinancial quantitative, and (c) qualitative information you will need before you can make a decision.



Group Activity: Divide the class into groups and ask them to discuss this MRA. Then debrief the entire class by asking one person from each group to summarize his or her group's discussion.

Excel Spreadsheet Analysis

MRA 4.

LO 4 Nonfinancial Data

REQUIRED



Refer to assignment P 6 in this chapter. Lindy Raymond needs to analyze the work performed by each shift in each department during Weeks 1 through 4.

1. For each department, calculate the average labor hours worked per board for each shift during Weeks 1 through 4. Carry your solution to two decimal places. (Note: Hours worked per board = hours worked each week ÷ boards produced each week.)
2. Using the ChartWizard and the information from 1, prepare a line graph for each department that compares the hours per board worked by the first and second shifts

and the estimate for that department during Weeks 1 through 4. Below is the suggested format to use for the information table necessary to complete the line graph for the Molding Department.

	Molding Department			
	Week 1	Week 2	Week 3	Week 4
First shift	3.50	3.20	3.40	3.80
Second shift	3.60	3.40	3.80	4.20
Estimated	3.40	3.40	3.40	3.40

3. Examine the four graphs that you prepared in 2. Which shift is more efficient in all four departments? List some reasons for the differences between the shifts.

Internet Case

Refer to the Decision Point for this chapter on Honda Motor Company's new green car, the Insight. Toyota Motor Company also has introduced a green car called the Prius. Search Toyota's web site at <http://www.toyota.com> for data concerning the Prius's success. Compare those data with Honda Motor Company's data on the Insight at <http://www.honda.com>. (Hint: Review annual reports, press releases, and model sites, or use the company's search engine.)

1. List the financial and nonfinancial measures used by Toyota. List the measures used by Honda.
2. Use the data you found to prepare a brief comparison of the two cars. Do the two companies use comparable performance measures? If so, evaluate the performance of the Prius and the Insight. If the measures are not comparable, how does their focus differ?

MRA 5.

LO 4 Comparison of Performance Measures

REQUIRED



ENDNOTES

1. Frederic M. Biddle, "A Little Gas Fuels Hope for a New Type of Electric Car," *The Wall Street Journal*, July 9, 1999.
2. Northiko Shirouzu, "Honda Bucks Industry Wisdom, Aiming to Be Small and Efficient," *The Wall Street Journal*, July 9, 1999.
3. Institute of Management Accountants, *Statement No. 1A* (New York, 1982). Since this definition was prepared, the importance of nonfinancial information has increased significantly. Words in brackets were added by the authors.
4. William M. Bulkeley, "Toys 'R' Us Names Hasbro's Barbour for Online Unit," *The Wall Street Journal*, August 3, 1999.
5. AICPA web site, www.aicpa.org, "The New Finance."
6. ISO web site, www.iso.ch/infoe, "ISO 14000."
7. Gregory L. White, "GM Appears to Step Back from Proposal," *The Wall Street Journal*, March 30, 1999.

20


Cost Concepts and Cost Allocation

LEARNING OBJECTIVES

- 1** State how managers use information about costs in the management cycle.
- 2** Identify various approaches managers use to classify costs.
- 3** Define and give examples of the three elements of product cost and compute a product unit cost for a manufacturing organization.
- 4** Describe the flow of product-related activities, documents, and costs through the Materials Inventory, Work in Process Inventory, and Finished Goods Inventory accounts.
- 5** Prepare a statement of cost of goods manufactured and an income statement for a manufacturing organization.
- 6** Define *cost allocation* and explain how cost objects, cost pools, and cost drivers are used to apply manufacturing overhead.
- 7** Calculate product unit cost using the traditional allocation of manufacturing overhead costs.
- 8** Calculate product unit cost using activity-based costing to assign manufacturing overhead costs.
- 9** Apply costing concepts to a service organization.



DECISION POINT: A MANAGER'S FOCUS

 **Caterpillar** Caterpillar, the world's leading manufacturer of construction and mining equipment, diesel and natural gas engines, and industrial gas turbines, makes some of the world's most complex and expensive vehicles. For instance, the Caterpillar 797 is the biggest mining truck ever made. Think of it as a two-story house, going down the road at 40 miles per hour on six 13-foot-high tires, carrying a load weighing 360 tons. The truck and its load are twice the weight of a fully loaded Boeing 747 aircraft. Each truck takes 11 days to build and costs about \$2.5 million. The accuracy of this cost figure is important to management because it is used in many ways, including to set the price of \$3.5 million for the Caterpillar 797.¹ Determining the cost of the truck requires complex analyses of many factors. What are some of those factors, and how do they bear on management decisions?

The cost of the Caterpillar 797 includes not only the costs of the materials and labor used in making the truck, but also a large component for overhead, such as the factory, electricity, supervision, maintenance, and other costs that cannot be directly traced to the truck. Operating costs for selling and administration must also be considered. To help management make decisions that will enable Caterpillar to sell these trucks for a profit, all related costs must be analyzed in terms of their traceability and behavior, whether or not they add value, and how they will affect the financial statements. Because many of the costs will not be directly traceable to the Caterpillar 797 or to specific departments, management must use a method of allocation to assign them. Possibilities include traditional allocation methods and newer methods such as activity-based costing. This chapter provides an introduction to cost classification, reporting, and allocation and will serve as the foundation for the techniques that will be presented in subsequent chapters.

Cost Information and the Management Cycle

OBJECTIVE

1 State how managers use information about costs in the management cycle

One of the primary goals of a company is to be profitable. Because owners expect to earn profits, managers have a responsibility to use resources wisely and generate revenues that will exceed the costs of the organization's operating, investing, and financing activities. In this chapter, we will focus on costs related to production activities in a manufacturing organization and to service activities in a service organization. First, let's look at information about costs and the management cycle for manufacturing, retail, and service companies.

Use of Cost Information in the Management Cycle

In the management cycle, managers use operating cost information to plan, execute, review, and report the results of operating activities. Figure 1 provides an overview of operating costs and the management cycle.



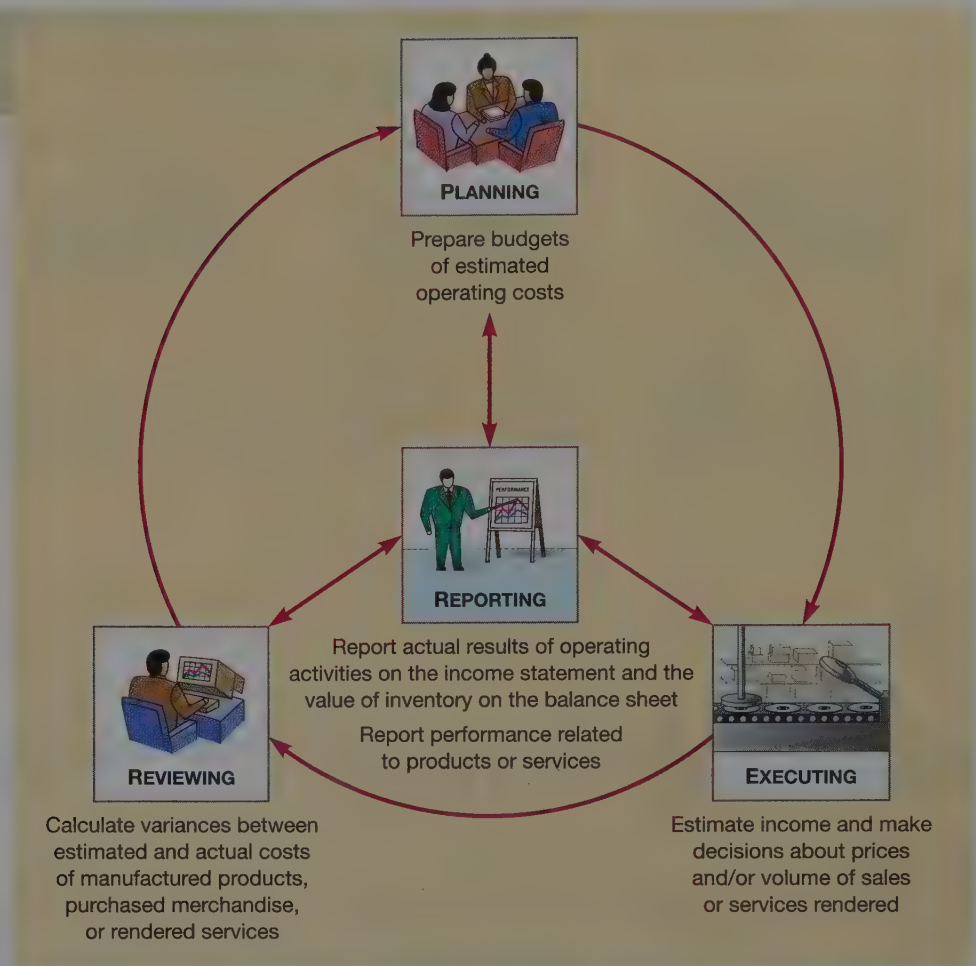
PLANNING In the planning stage, managers of manufacturing organizations, such as John Deere, Motorola, or General Motors, use estimated product cost information to develop budgets for production, direct materials, direct labor, and manufacturing overhead, and to determine the selling prices or sales levels required to cover all costs. In retail organizations, such as Sears, PepBoys, or Macy's, managers work with estimates of the cost of merchandise purchases to develop budgets for purchases and net income and to determine the selling prices or sales units required to cover all costs. In service organizations, like Citibank, Humana, or Accenture (formerly Andersen Consulting), managers utilize the estimated costs of rendering services to develop budgets, estimate fee revenues, and plan human resource needs.



EXECUTING In the executing stage, managers of manufacturing organizations use estimated product unit costs to estimate the gross margin and operating income on products sold and to make decisions about such matters as dropping a product line, outsourcing the manufacture of a part or subassembly to another manufacturer, bidding on a special order, or negotiating a selling price. In retail organizations, managers work with the estimated cost of merchandise purchases to estimate gross margin, operating income, and value of merchandise sold and to make decisions about such matters as reducing selling prices for clearance sales, offering lower selling prices for bulk sales orders, or dropping a product line. In service organizations, managers find the estimated cost of services helpful in estimating profitability and making decisions about such matters as bidding on future service assignments or projects, lowering the fee to charge a customer, dropping a service provided, or negotiating a fee.

REVIEWING In the reviewing stage, managers want to know about significant differences between estimated costs and actual costs. The identification of variances between estimated and actual product costs (for manufacturing organizations), estimated and actual costs of merchandise purchased (for retail organizations), and estimated and actual costs of services rendered (for service organizations) helps managers to determine the causes of cost overruns and enables them to adjust future actions to reduce potential problems.

Figure 1
Operating Costs and the
Management Cycle



REPORTING In the reporting stage, managers expect to see financial statements that include the actual costs associated with operating activities in the executing stage of the management cycle and also performance evaluation reports that summarize the variance analyses calculated in the reviewing stage. This is true for manufacturing, retail, and service organizations.

Cost Information and Organizations

Table 1 lists examples of the types and uses of cost information for different types of organizations. For a manufacturing organization, the product costs include the costs of direct materials, direct labor, and manufacturing overhead. For a retail organization, the costs of a purchased product include adjustments for freight-in costs, purchase returns and allowances, and purchase discounts. For a service organization, the costs to provide a service include the costs of labor and related overhead. Ultimately, a company is profitable only when revenues from sales or services rendered exceed all its costs, including both the costs of products and services and operating costs. Among such costs are the cost to manufacture or purchase a product or to render a service, plus the costs of marketing, distributing, installing, and repairing a product or the costs of marketing and supporting the delivery of services.

Table 1. Examples of Types and Uses of Cost Information for Different Types of Organizations

	Type of Organization		
	Manufacturing	Retail	Service
Cost information needed by management	Cost to manufacture the product	Cost to purchase the product	Cost to provide the service
Uses of cost information:			
To measure historical or future profits	Yes	Yes	Yes
To decide the selling price for regular or special sales or services provided	Yes	Yes	Yes
To value finished goods or merchandise inventories	Yes	Yes	Not applicable

Cost Classifications and Their Uses

OBJECTIVE

2 Identify various approaches managers use to classify costs

A single item of cost can be classified and used in several different ways, depending on the purpose of the analysis. A summary of commonly used cost classifications is shown in Figure 2. These classifications enable managers to (1) control costs by determining which costs are traceable to a particular destination, or cost object, such as a service or product; (2) calculate the number of units that must be sold to obtain a certain level of profit (cost behavior); (3) identify the costs of activities that add value to a product or service and activities that do not; and (4) classify costs for the preparation of financial statements. An understanding of these cost classifications will help managers select and use relevant information to operate efficiently, provide quality products or services, and satisfy customer needs.

Cost Traceability

Managers rely on management accountants to trace costs to cost objects, such as products or services, sales territories, departments, or operating activities. By tracing costs as directly as possible to cost objects, managers can develop a fairly accurate measurement of costs. Managers use these direct and indirect measures of costs to support pricing decisions or decisions to reallocate resources to other cost objects.

Direct costs are costs that can be conveniently or economically traced to a cost object. For example, the wages of production line workers can be conveniently traced to the product, because the time worked and the related hourly wages can be easily found by looking at time cards and payroll records. Similarly, the costs of an engine can be easily traced to an automobile's cost.

In some cases, however, even though a material becomes part of a finished product, the expense of tracing its cost is too great. Some examples include nails in furniture, bolts in automobiles, and rivets in airplanes. Such costs are considered indirect costs of the product. **Indirect costs** are costs that cannot be conveniently or economically traced to a cost object. Even though indirect costs may be difficult to trace, they must be included in the cost of a product. Therefore, management

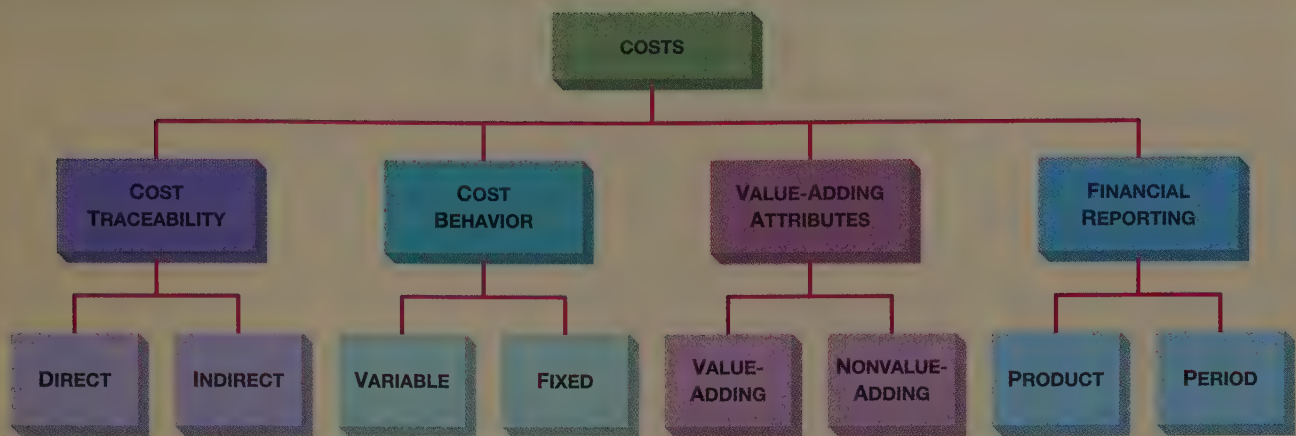


Figure 2
Overview of Cost Classifications

accountants use a formula to assign indirect costs to products. For example, insurance costs for the factory cannot be conveniently traced to individual products, but, for the sake of accuracy, they must be included in each product's cost. Management accountants solve the problem by assigning a portion of the factory insurance costs to each product manufactured.

Regardless of the type of organization—service, retail, or manufacturing—classifying costs is important. The following examples illustrate a cost object and its related direct and indirect costs for three kinds of organizations.

- In a service organization, such as an accounting firm, costs can be traced to a specific service, such as tax return preparation. Direct costs for tax return preparation services include the costs of paper, computer usage, and labor to prepare the return. Indirect costs include the costs of supplies, office rental, utilities, secretarial labor, telephone usage, and depreciation of office furniture.
- In a retail organization, such as a department store, costs can be traced to a department. For example, the direct costs of the shoe department include the costs of shoes and the wages of employees working in that department. Indirect costs include the costs of utilities, insurance, property taxes, storage, and handling.
- In a manufacturing organization, costs can be traced to the product. Direct costs of the product include the costs of direct materials and direct labor. Indirect costs include the costs of utilities, depreciation of equipment, insurance, property taxes, inspection, maintenance of machinery, storage, handling, and cleaning.

Cost Behavior

Managers are also interested in the way costs respond to changes in volume or activity. By analyzing those patterns of behavior, managers gain information about how changes in selling prices or operating costs affect the net income of the organization. Costs can be separated into variable costs and fixed costs. A **variable cost** is a cost that changes in direct proportion to a change in productive output (or any other measure of volume). A **fixed cost** is a cost that remains constant within a defined range of activity or time period.

Viewing costs as variable or fixed is important to managers of any type of organization. The following examples illustrate variable and fixed costs for service, retail, and manufacturing organizations:

- A landscaping service has variable costs that include the cost of landscaping materials and direct labor to plant the materials for each landscaping project. Fixed costs include the costs of depreciation on trucks and equipment, nursery rent, insurance, and property taxes.
- A retail used-car dealership has variable costs that include the cost of cars sold and sales commissions. Fixed costs include the costs of building and lot rental, depreciation on office equipment, and salaries of the receptionist and accountant.
- A lawn mower manufacturer has variable costs that include the costs of direct materials, direct labor, indirect materials (bolts, nails, lubricants), and indirect labor (inspection and maintenance labor). Fixed costs include the costs of supervisory salaries and depreciation on buildings.

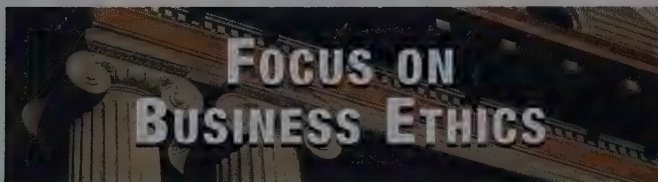
Value-Adding Versus Nonvalue-Adding Costs

A **value-adding cost** is the cost of an activity that increases the market value of a product or service. A **nonvalue-adding cost** is the cost of an activity that adds cost to a product or service but does not increase its market value. In the spirit of continuous improvement, managers examine the value-adding attributes of the activities and processes in their organization. Their goal is to reduce or eliminate activities that do not add value to the products or services. The organization identifies the characteristics of the product or service that customers value and would be willing to pay for. This information influences the design of future products or the delivery of future services. The organization's management also identifies the operating activities that provide the value. Activities that do not add value are reduced or eliminated. For example, the depreciation of a machine that shapes a part assembled into the final product is a value-adding cost; the depreciation of a sales department automobile is a nonvalue-adding cost.

Costs incurred to improve the quality of a product are value-adding costs if the customer is willing to pay more for the higher-quality product; otherwise, they are nonvalue-adding costs because they do not increase the product's market value. The costs of administrative activities such as accounting and human resources are nonvalue-adding costs; they are necessary for the operation of the business, but they do not add value to the product.

Costs for Financial Reporting

Managers must prepare financial statements for external parties using a required format based on generally accepted accounting principles. For purposes of financial reporting, costs are divided into product costs and period costs. **Product costs**, or *inventoriable costs*, are costs assigned to inventory; they include direct materials, direct labor, and manufacturing overhead. Product costs appear on the income



United Parcel Service (UPS) has taken a proactive role in its commitment to efficient and responsible management of resources. UPS recycles computer paper, letter envelopes, and delivery notices, and it also records delivery information electronically,



which saves an estimated 30,000 trees annually. UPS also helps customers protect the environment by (1) devising the best packaging methods to prevent product damage and minimize waste and (2) developing national package-retrieval services to collect a customer's packaging. For example, Ethan Allen, Inc., a furniture maker and retailer, uses UPS's services to retrieve foam-sheet shipping material, which makes money for Ethan Allen in addition to reducing its disposal costs.²

Table 2. Examples of Cost Classifications for a Candy Manufacturer

Cost Examples	Traceability to Product	Cost Behavior	Value Attribute	Financial Reporting
Sugar for candy	Direct	Variable	Value-adding	Product (direct materials)
Labor for mixing	Direct	Variable	Value-adding	Product (direct labor)
Labor for supervision	Indirect	Fixed	Nonvalue-adding	Product (manufacturing overhead)
Depreciation on mixing machine	Indirect	Fixed	Value-adding	Product (manufacturing overhead)
Sales commission	—*	Variable	Value-adding [†]	Period
Accountant's salary	—*	Fixed	Nonvalue-adding	Period

* Sales commission and accountant's salary are not product costs. Therefore, these costs are not directly or indirectly traceable in traditional business operations.

[†] Sales commission can be value-adding because customers' perceptions of the salesperson and the selling experience can strongly affect their perceptions of the product's or service's market value.

statement as cost of goods sold or on the balance sheet as finished goods inventory. **Period costs**, or *noninventoriable costs*, are costs of resources consumed during the accounting period and not assigned to products. They appear as operating expenses on the income statement. For example, selling and administrative expenses are period costs.

Table 2 shows how some sample costs of a candy manufacturer can be classified in terms of traceability, behavior, value attribute, and financial reporting.

Elements of Product Costs

OBJECTIVE

3 Define and give examples of the three elements of product cost and compute a product unit cost for a manufacturing organization

Product costs include all costs related to the manufacturing process. The three elements of product cost are (1) direct materials costs, (2) direct labor costs, and (3) manufacturing overhead costs, which are indirect manufacturing costs.

Direct Materials Costs

All manufactured products are made from basic direct materials. **Direct materials costs** are the costs of materials that can be conveniently and economically traced to specific units of product. Some examples of direct materials are iron ore for steel, sheet steel for automobiles, and sugar for candy.

Direct Labor Costs

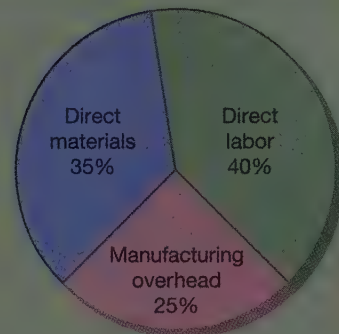
The manufacturing process includes all activities required to make a product, including maintenance, handling, inspecting, moving, and storing. **Direct labor costs** are the costs of labor to complete production activities that can be conveniently and economically traced to specific units of product. The wages of machine operators and other workers involved in actually shaping the product are direct labor costs.

Manufacturing Overhead Costs

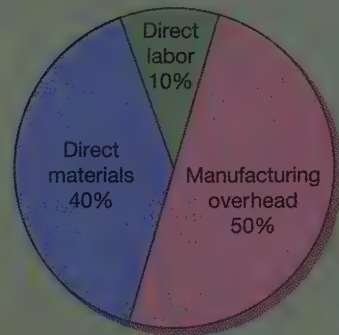
The third element of product cost includes all manufacturing costs that cannot be classified as direct materials or direct labor costs. **Manufacturing overhead costs** are production-related costs that cannot be practically or conveniently traced directly to an end product. This assortment of costs is also called *factory overhead*,

FOCUS ON BUSINESS TECHNOLOGY

Technology and new manufacturing processes have produced entirely new patterns of product costs. The three elements of product cost are still direct materials, direct labor, and manufacturing overhead. However, the percentage that each element contributes to the total cost of a product has changed. During the 1950s, 1960s, and 1970s, direct labor was the dominant cost element, making up over 40 percent of total product cost. Direct materials contributed 35 percent and manufacturing overhead around 25 percent of total cost. Seventy-five percent of total product cost was a direct cost, traceable to the product. Improved production technology caused a dramatic shift in the three product cost elements. People were replaced by machines, and direct labor was reduced significantly. Today, only 50 percent of the cost of a product is directly traceable to the product; the other 50 percent is manufacturing overhead, an indirect cost.



1950s–1970s



TODAY

factory burden, or *indirect manufacturing costs*. Two common components of manufacturing overhead costs are indirect materials costs and indirect labor costs. **Indirect materials costs** are the costs of materials that cannot be conveniently or economically traced to a unit of product. Labor costs for production-related activities that cannot be conveniently or economically traced to a unit of product are **indirect labor costs**. Examples of the major components of manufacturing overhead costs are as follows:

- **Indirect materials costs:** costs of nails, rivets, lubricants, and small tools
- **Indirect labor costs:** costs of labor for maintenance, inspection, engineering design, supervision, materials handling, and machine handling
- **Other indirect manufacturing costs:** costs of building maintenance, machinery and tool maintenance, property taxes, property insurance, depreciation on plant and equipment, rent, and utilities

As indirect costs, manufacturing overhead costs are allocated to a product's cost using traditional or activity-based costing methods, which will be explained later in this chapter.

To illustrate product costs and the manufacturing process, we will learn how Angelo Sanchez, the owner of Angelo's Rolling Suitcases, Inc., operates part of his business. In the 1990s, Sanchez began building rolling suitcases, versions of the flight crew bag used for years by airline pilots and flight attendants. The suitcases are made of ballistic nylon fabric wrapped around a rigid frame. They have a retractable pull handle at one end and wheels at the other end. Stair skids protect the fabric from abrasion, and carrying handles on the side and top of the bag improve handling.

Sanchez identified the following elements of the product cost of one rolling suitcase:

- **Direct material costs:** costs of the frame, ballistic nylon fabric, retractable pull handle, and wheels
- **Direct labor costs:** costs of labor used to build the rolling suitcase
- **Manufacturing overhead costs:** indirect materials costs, such as the costs of zippers, interior mesh storage pockets, garment straps, carrying handles, stair skids, and wheel lubricants; indirect labor costs, such as the costs of labor associated with moving the materials to the production area and inspecting the rolling suitcase during its construction; other overhead costs, such as depreciation on the building and equipment used to make the rolling suitcases plus the utilities, property taxes, and insurance expenses related to the manufacturing plant

Computing Product Unit Cost in a Manufacturing Company

Product unit cost is the manufacturing cost of a single unit of product. It is computed by either (1) dividing the total cost of direct materials, direct labor, and manufacturing overhead by the total number of units produced or (2) determining the cost per unit for each element of the product cost and summing those per-unit costs.

Unit cost information helps managers price products and calculate gross margin and net income. Managers or accountants can calculate the product unit cost using actual costing, normal costing, or standard costing methods. Table 3 summarizes the use of actual or estimated costs for the three cost-measurement methods.

The **actual costing** method uses the *actual* costs of direct materials, direct labor, and manufacturing overhead to calculate the actual product unit cost at the *end* of the accounting period, when actual costs are known. The actual product unit cost is assigned to the finished goods inventory on the balance sheet and to the cost of goods sold on the income statement. For example, assume that Angelo's Rolling Suitcases, Inc., produced 30 rolling suitcases on December 28, 20x4, for a corporate customer in Salt Lake City. Jamie Estrada, the company's accountant, calculated that the actual costs for the Salt Lake City order were direct materials, \$540; direct labor, \$420; and manufacturing overhead, \$240. The actual product unit cost for the order was \$40.

Direct materials (\$540 ÷ 30 rolling suitcases)	\$18
Direct labor (\$420 ÷ 30 rolling suitcases)	14
Manufacturing overhead (\$240 ÷ 30 rolling suitcases)	8
Product cost per rolling suitcase (\$1,200 ÷ 30 rolling suitcases)	<u>\$40</u>

In this case, the product unit cost was computed after the job was completed and all cost information was known. However, sometimes a company needs to know product unit cost while production is under way, when the actual direct materials costs and direct labor costs are known, but the actual manufacturing

Table 3. Summary of the Use of Actual or Estimated Costs in Three Cost-Measurement Methods

Product Cost Elements	Actual Costing	Normal Costing	Standard Costing
Direct materials	Actual costs	Actual costs	Estimated costs
Direct labor	Actual costs	Actual costs	Estimated costs
Manufacturing overhead	Actual costs	Estimated costs	Estimated costs

overhead costs are uncertain. Then the product unit cost will include an estimate of the manufacturing overhead applied to the product.

The **normal costing** method combines *actual* direct materials and direct labor costs with *estimated* manufacturing overhead costs to determine a normal product unit cost. Manufacturing overhead costs must be estimated because the actual amount of such indirect costs for each product is difficult to determine. The normal costing method is simple and allows a smoother, more even assignment of manufacturing overhead costs to production *during* the year. It also contributes to better pricing decisions and profitability estimates. However, at the end of the year, any difference between the estimated and the actual costs must be identified and removed so that the financial statements show only the actual product costs.

Assume that normal costing was used to price the Salt Lake City order for rolling suitcases. Manufacturing overhead was applied to the product's cost using an estimated, or predetermined, overhead rate of 60 percent of direct labor costs. Based on that method, the costs for the order included the actual direct materials cost of \$540.00, the actual direct labor cost of \$420.00, and the estimated manufacturing overhead cost of \$252.00 ($\$420.00 \times .6$). The normalized product unit cost was \$40.40.

Direct materials ($\$540.00 \div 30$ rolling suitcases)	\$18.00
Direct labor ($\$420.00 \div 30$ rolling suitcases)	14.00
Manufacturing overhead ($\$252.00 \div 30$ rolling suitcases)	<u>8.40</u>
Product cost per rolling suitcase ($\$1,212 \div 30$ rolling suitcases)	<u><u>\$40.40</u></u>

In this case, the product unit cost was computed using actual and estimated cost information. Later in this chapter, we will discuss various methods of assigning manufacturing overhead costs to finished products.

Sometimes managers need product costing information before the accounting period begins, so that they can control operating activities. Or sometimes an organization needs to price a proposed product for a customer. In such situations, product unit costs must be estimated, and the **standard costing** method can be helpful. This method uses *estimated* (or standard) costs of direct materials, direct labor, and manufacturing overhead to calculate the standard product unit cost. This estimated product unit cost is useful as a benchmark for pricing decisions during the year and for controlling product costs.

Assume Angelo's must place a bid to manufacture 20 rolling suitcases for a new Italian customer. Using standard cost information, Estrada has *estimated* the following costs: \$20 per unit for direct materials, \$15 per unit for direct labor, and \$9 for manufacturing overhead (assuming a standard, or predetermined, overhead rate of 60 percent of direct labor cost). The standard cost per unit would be \$44.

Direct materials	\$20
Direct labor	15
Manufacturing overhead ($\$15 \times .6$)	<u>9</u>
Product cost per rolling suitcase	<u><u>\$44</u></u>

The \$44 product unit cost is useful for estimating the gross margin for the job and deciding the price to bid for the Italian company's business. Standard costing is discussed in more detail in another chapter.

Prime Costs and Conversion Costs

The three elements of manufacturing costs may be grouped into prime costs and conversion costs. **Prime costs** are the primary costs of production and are the sum of the direct materials costs and direct labor costs. **Conversion costs** are the costs

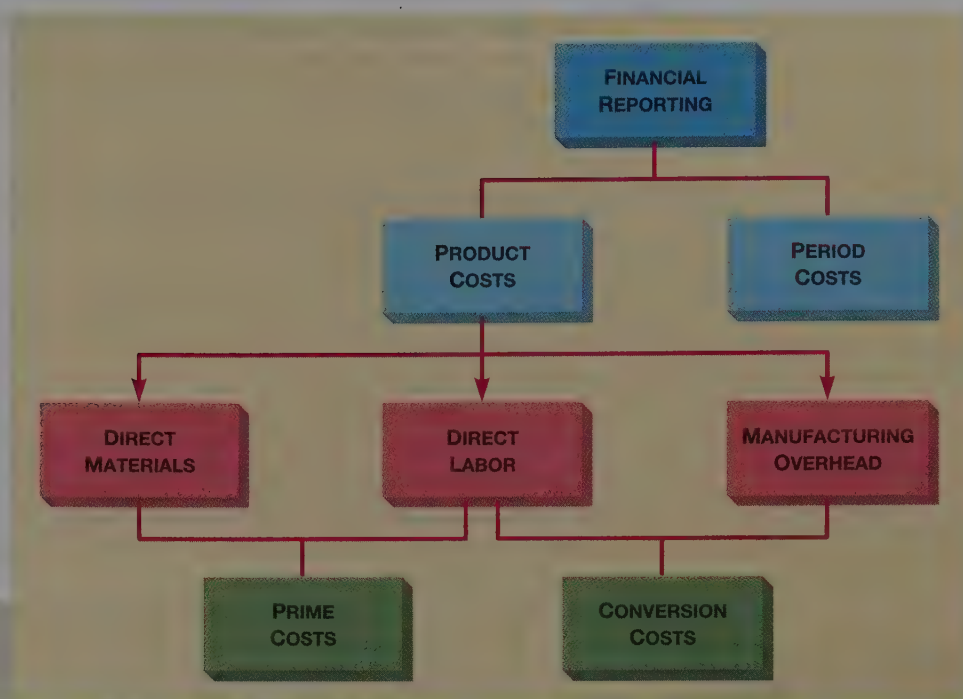


Figure 3
Relationships Among Product Costs

of converting direct materials into finished product and are the sum of direct labor costs and manufacturing overhead costs. Using the figures for the actual unit cost of Angelos's rolling suitcases, the prime costs and conversion costs per unit are as follows:

	Prime Costs	Conversion Costs
Direct materials	\$18	NA
Direct labor	14	\$14
Manufacturing overhead	NA	8
Totals	<u>\$32</u>	<u>\$22</u>

These classifications are important for understanding the costing methods discussed in later chapters. Figure 3 summarizes the relationships among the product cost classifications presented so far.

Manufacturing Inventory Accounts

OBJECTIVE

4 Describe the flow of product-related activities, documents, and costs through the Materials Inventory, Work in Process Inventory, and Finished Goods Inventory accounts

Manufacturing organizations use a number of production and production-related activities to transform materials into finished products. Materials are brought into the organization through purchasing, receiving, inspecting, moving, and storing activities. Production activities convert the materials into a finished product using labor, equipment, and other resources. Moving and storing activities transfer the completed product to the finished goods storage area. The accounting system tracks these activities as product costs flowing through the Materials Inventory, Work in Process Inventory, and Finished Goods Inventory accounts. The **Materials Inventory account** holds the balance of the cost of unused materials, the **Work In**

Process Inventory account records the manufacturing costs that are incurred and assigned to partially completed units of product, and the **Finished Goods Inventory account** holds the costs assigned to all completed products that have not been sold.

Document Flows and Cost Flows Through the Inventory Accounts

In many companies, accountants accumulate and report manufacturing costs based on source documents that support production and production-related activities. Looking at how the source documents for the three elements of product cost relate to the flow of costs through the three inventory accounts for a manufacturing organization provides insight into when an activity must be recorded in the accounting records. Figure 4 summarizes the relationships among the production activities, the documents for each of the three cost elements, and the inventory account(s) that are affected by the activities. An organization may use paper documents or computer-transmitted information to communicate with suppliers, customers, and internal departments.

To illustrate the document flow and changes in inventory balances for production activities, we will continue with our example of Angelo's Rolling Suitcases, Inc.

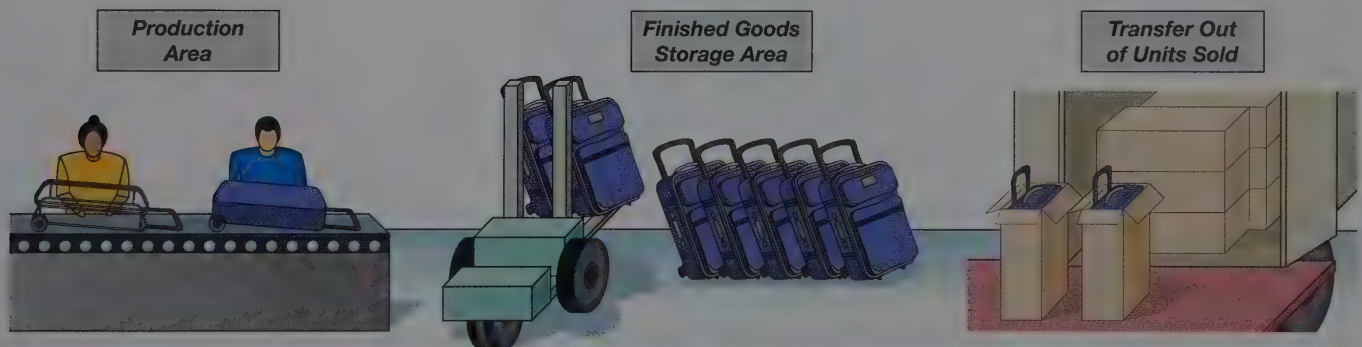
Figure 4
Activities, Documents, and
Cost Flows Through the
Inventory Accounts of a
Manufacturing Organization



	ACTIVITY	Purchase, receive, inspect, move, and store materials in materials storeroom	Move materials to production area
	DOCUMENT	Purchase request Purchase order Receiving report Vendor's invoice	Materials request
INVENTORY ACCOUNT AFFECTED/CHANGE IN BALANCE	MATERIALS INVENTORY	Increases for cost of materials purchased	Decreases for cost of materials used in the production process, whether direct or indirect
	WORK IN PROCESS INVENTORY		Increases for cost of direct materials used in the production process
	FINISHED GOODS INVENTORY		

PURCHASING MATERIALS The same process is used for purchasing both direct and indirect materials. The purchasing process starts with a *purchase request* for specific quantities of materials needed in the manufacturing process but not currently available in the materials storeroom. A qualified manager approves the request. Based on the information in the purchase request, the Purchasing Department sends *purchase orders* to its suppliers. When the materials arrive, an employee on the receiving dock counts and examines them and prepares a *receiving report*. Later, an accounting clerk matches the information on the receiving report with the descriptions and quantities listed on the purchase order. A material handler moves the newly arrived materials from the receiving area to the materials storeroom. Soon, Angelo's receives a *vendor's invoice* requesting payment for the purchased materials. The cost of those materials increases the balance of the Materials Inventory account.

MATERIALS REQUISITION AND CONVERSION When the rolling suitcases are scheduled for production, the storeroom clerk receives a *materials request form*. The materials request form is essential for controlling materials. Besides providing the supervisor's approval signature, it describes the types and quantities of materials the storeroom clerk must pick and send to the production area, and it authorizes the release of those materials into production. If the materials request form has been approved by the appropriate manager, the storeroom clerk has the



Convert materials into finished product using direct labor and manufacturing overhead Package some types of products	Move completed units of product to finished goods storage area	Sell units of product to customer; pack and ship product
Time card Job order cost card Vendors' invoices for manufacturing overhead items	Job order cost card	Sales invoice Shipping document
Increases for costs of direct labor and manufacturing overhead	Decreases for cost of completed units of product	
	Increases for cost of completed units of product	Decreases for cost of goods sold

material handler move the materials to the production floor. The cost of the direct materials transferred will increase the balance of the Work in Process Inventory account and decrease the balance of the Materials Inventory account. The cost of the indirect materials transferred will increase the balance of the Manufacturing Overhead account and decrease the balance of the Materials Inventory account.

The production employees assemble the rolling suitcases. Each production employee prepares a *time card* to record the number of hours he or she has worked on this and other orders each day. The costs of the direct labor and manufacturing overhead used to manufacture the rolling suitcases increase the balance of the Work in Process Inventory account. A *job order cost card* is used to record all costs incurred as the products move through production.

PRODUCT COMPLETION AND SALE Employees place completed rolling suitcases in individual boxes, then move the boxes to the finished goods storeroom and store them there until the scheduled shipment date. The balance of the Finished Goods Inventory account increases and the balance of the Work in Process Inventory account decreases for the cost of the completed rolling suitcases.

When suitcases are sold, a clerk prepares a *sales invoice* while another employee fills the order by removing the rolling suitcases from the storeroom, packaging them, and shipping them to the customer. A *shipping document* shows the quantity and description of the products that were shipped. The cost of the rolling suitcases sold increases the Cost of Goods Sold account and decreases the balance of the Finished Goods Inventory account.

The Manufacturing Cost Flow

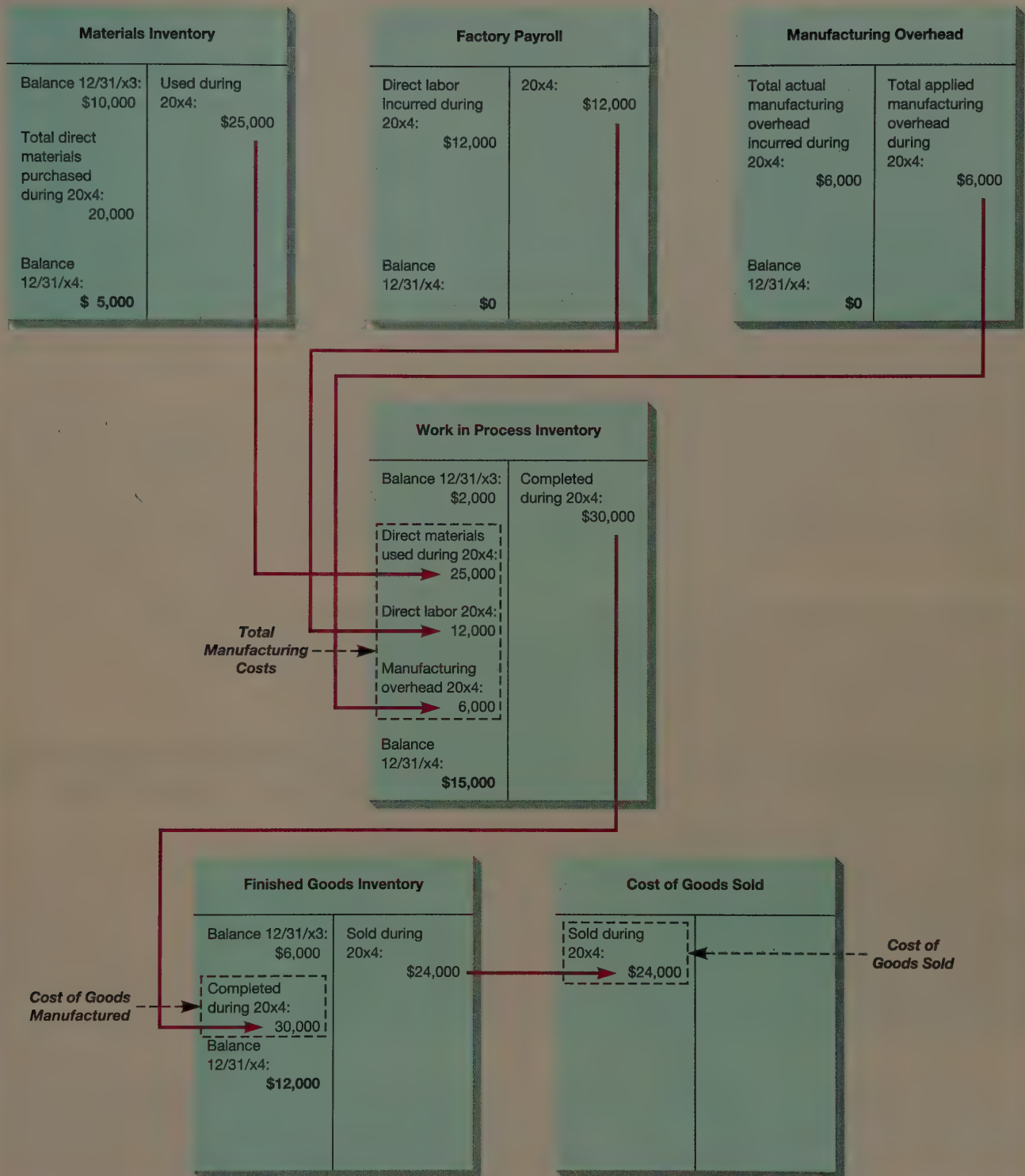
Manufacturing cost flow is the flow of manufacturing costs (direct materials, direct labor, and manufacturing overhead) from their incurrence through the Materials Inventory, Work in Process Inventory, and Finished Goods Inventory accounts into the Cost of Goods Sold account. A defined, structured manufacturing cost flow is the foundation for product costing, inventory valuation, and financial reporting. The manufacturing cost flow as it relates to the accounts in the general ledger and the production activity at Angelo's Rolling Suitcases, Inc., for the year ended December 31, 20x4, is summarized in Figure 5. To show the basic flows in this example, we assume that all materials can be traced directly to the rolling suitcases. This means there are no indirect materials in the Materials Inventory account. We also work with the actual amount of manufacturing overhead, not an applied amount.

Because there are no indirect materials in this case, the Materials Inventory account shows the balance of unused direct materials. The cost of direct materials purchased increases the Materials Inventory account, and the cost of direct materials requested and used by the Production Department decreases the balance. The following formula may be used to summarize the activity of the Materials Inventory account for the year:

Materials Inventory, Ending Balance	=	Materials Inventory, Beginning Balance	+	Cost of Direct Materials Purchased	-	Cost of Direct Materials Used
\$5,000	=	\$10,000	+	\$20,000	-	\$25,000

The Work in Process Inventory account records the balance of partially completed units of product. As direct materials and direct labor are used, their costs are added to the Work in Process Inventory account. The cost of manufacturing overhead for the current period is also added. The total costs of direct materials,

Figure 5
Manufacturing Cost Flow:
An Example



direct labor, and manufacturing overhead incurred and transferred to work in process inventory during an accounting period are called **total manufacturing costs**. Total manufacturing costs increase the balance of the Work in Process Inventory account.

As goods are finished, they are moved to the finished goods storage area. The cost of all units completed and moved to finished goods storage during an accounting period is the **cost of goods manufactured**. The cost of goods manufactured for the period decreases the balance of the Work in Process Inventory account. The following formulas show the activity in the Work in Process Inventory account for Angelo's Rolling Suitcases, Inc., for the year:

Total Manufacturing Costs	=	Cost of Direct Materials Used	+	Direct Labor Costs	+	Manufacturing Overhead Costs
\$43,000	=	\$25,000	+	\$12,000	+	\$6,000
Work in Process Inventory, Ending Balance	=	Work in Process Inventory, Beginning Balance	+	Total Manufacturing Costs	-	Cost of Goods Manufactured
\$15,000	=	\$2,000	+	\$43,000	-	\$30,000

The Finished Goods Inventory account holds the balance of costs assigned to all completed products that have not been sold by a manufacturing company. The cost of goods manufactured increases the balance, and the cost of goods sold decreases the balance. The following formula shows the activity in the Finished Goods Inventory account for Angelo's Rolling Suitcases, Inc., for the year:

Finished Goods Inventory, Ending Balance	=	Finished Goods Inventory, Beginning Balance	+	Cost of Goods Manufactured	-	Cost of Goods Sold
\$12,000	=	\$6,000	+	\$30,000	-	\$24,000

Manufacturing and Financial Reporting

OBJECTIVE

5 Prepare a statement of cost of goods manufactured and an income statement for a manufacturing organization

The financial statements of manufacturing organizations differ very little from those of merchandising organizations. Account titles on the balance sheet of manufacturers are similar to those used by merchandisers. The primary difference between the balance sheets is that manufacturing organizations use three inventory accounts whereas merchandising organizations use only one. The income statements for a merchandiser and a manufacturer are also similar. However, manufacturers use the heading Cost of Goods Manufactured in place of the Purchases account. Also, the Merchandise Inventory account is replaced by the Finished Goods Inventory account.

The key to preparing an income statement for a manufacturing organization is to determine the cost of goods manufactured. This dollar amount is calculated on the statement of cost of goods manufactured, a special statement based on an analysis of the Work in Process Inventory account.

Statement of Cost of Goods Manufactured

At the end of the period, the flow of all manufacturing costs incurred during the period is summarized in the **statement of cost of goods manufactured**. The

Exhibit 1
Statement of Cost of Goods
Manufactured and Income
Statement for a Manufacturing
Organization

Angelo's Rolling Suitcases, Inc.	
Statement of Cost of Goods Manufactured	
For the Year Ended December 31, 20x4	
Step 1	Direct Materials Used
	Materials Inventory,
	December 31, 20x3 \$10,000
	Direct Materials Purchased <u>20,000</u>
	Cost of Direct Materials Available
Step 2	for Use \$30,000
	Less Materials Inventory,
	December 31, 20x4 <u>5,000</u>
	Cost of Direct Materials Used <u>\$25,000</u>
Step 2	Direct Labor 12,000
	Manufacturing Overhead <u>6,000</u>
	Total Manufacturing Costs <u>\$43,000</u>
Step 3	Add Work in Process Inventory,
	December 31, 20x3 <u>2,000</u>
	Total Cost of Work in Process
	During the Year \$45,000
	Less Work in Process Inventory,
	December 31, 20x4 <u>15,000</u>
	Cost of Goods Manufactured <u><u>\$30,000</u></u>

Angelo's Rolling Suitcases, Inc.	
Income Statement	
For the Year Ended December 31, 20x4	
Sales	\$50,000
Cost of Goods Sold	
Finished Goods Inventory, December 31, 20x3	\$ 6,000
Cost of Goods Manufactured	<u>30,000</u> ←
Total Cost of Finished Goods Available for Sale	\$36,000
Less Finished Goods Inventory, December 31, 20x4	<u>12,000</u>
Cost of Goods Sold	<u>24,000</u>
Gross Margin	\$26,000
Selling and Administrative Expenses	<u>16,000</u>
Net Income	<u><u>\$10,000</u></u>

flow of manufacturing costs incurred at Angelo's Rolling Suitcases, Inc., for the year ended December 31, 20x4, is shown in Figure 5, and the period's statement of cost of goods manufactured is shown in Exhibit 1. It is helpful to think of the statement of cost of goods manufactured as being developed in three steps.

STEP 1 Compute the cost of direct materials used. To do so, add the beginning balance in the Materials Inventory account to the direct materials purchased

(\$10,000 + \$20,000). The subtotal represents the cost of direct materials available for use during the period (\$30,000). Then, subtract the ending balance of Materials Inventory from the cost of direct materials available for use. The difference is the cost of direct materials used during the period (\$30,000 - \$5,000 = \$25,000).

STEP 2 Calculate total manufacturing costs for the period (\$43,000). As shown in Exhibit 1, the costs of direct materials used (\$25,000) and direct labor (\$12,000) are added to total manufacturing overhead costs incurred (\$6,000) during the period.

STEP 3 Determine the total cost of goods manufactured for the period. Add the beginning balance in Work in Process Inventory to total manufacturing costs for the period to arrive at the total cost of work in process during the period. From this amount, subtract the ending balance in Work in Process Inventory to get the cost of goods manufactured (\$45,000 - \$15,000 = \$30,000).

The term *total manufacturing costs* should not be confused with the cost of goods manufactured. To understand the difference between these two dollar amounts, look again at the computations in Exhibit 1. Total manufacturing costs of \$43,000 incurred during the period are added to the beginning balance in Work in Process Inventory. Costs of \$2,000 in the beginning balance are, by definition, costs from an earlier period. The costs of two accounting periods are now being mixed to arrive at the total cost of work in process during the period (\$43,000 + \$2,000 = \$45,000). The costs of products still in process (\$15,000) are then subtracted from the total cost of work in process during the year. The remainder, \$30,000, is the cost of goods manufactured (completed) during the current year. It is assumed that the items in beginning inventory were completed first. The costs attached to the ending balance of Work in Process Inventory are part of the current period's total manufacturing costs. However, they will not become part of the cost of goods manufactured until the next period, when the products are completed.

Cost of Goods Sold and the Income Statement

Exhibit 1 demonstrates the relationship between the income statement and the statement of cost of goods manufactured. The total amount of the cost of goods manufactured during the period is carried over to the income statement. There, it is used to compute the cost of goods sold. The beginning balance of Finished Goods Inventory is added to the cost of goods manufactured to get the total cost of finished goods available for sale during the period (\$6,000 + \$30,000 = \$36,000). The cost of goods sold is then computed by subtracting the ending balance in Finished Goods Inventory (the cost of goods completed but not sold) from the total cost of finished goods available for sale (\$36,000 - \$12,000 = \$24,000). The cost of goods sold is considered an expense in the period in which the related products are sold.

Cost Allocation

OBJECTIVE

6 Define *cost allocation* and explain how cost objects, cost pools, and cost drivers are used to apply manufacturing overhead

The product cost elements of direct materials and direct labor can be easily traced to a product, but manufacturing overhead costs are indirect costs that must be collected and allocated in some manner. **Cost allocation** is the process of assigning or applying collected indirect costs to specific cost objects using an allocation base that represents a major function of the business. A **cost object** is the destination

of an assigned, or allocated, cost. For example, a cost may be assigned to a particular product, service, or department. For purposes of product costing, cost allocation is the assignment of manufacturing overhead costs to the product (cost object) during the accounting period.

To understand cost allocation, you also need to understand the terms *cost pool* and *cost driver*. For purposes of product costing, a **cost pool** is a collection of overhead costs related to a cost object (a production-related activity). A **cost driver** is an activity that causes the cost pool to increase in amount as the cost driver increases in volume. Cost allocation requires (1) the pooling of manufacturing overhead costs that are affected by a common activity and (2) the selection of a cost driver whose activity level causes a change in the cost pool.

The Manufacturing Overhead Allocation Process

The process of applying or assigning manufacturing overhead costs is part of the management cycle presented in Figure 1. In the planning stage, manufacturing overhead costs are estimated and an application rate is calculated. In the executing stage, manufacturing overhead costs are applied to products during the production process as manufacturing overhead costs are incurred and recorded. In the reviewing stage, the difference between the actual and applied manufacturing overhead costs is calculated and analyzed. The difference is then disclosed in the reporting stage.

There are four steps in the process of applying manufacturing overhead. Figure 6 shows the relationship of the four steps over a time period that includes the planning process and the manufacturing process for one year. Figure 6 also describes each step and its timing, procedure, and journal entry, if needed.

STEP 1 In Step 1, the planning step, a predetermined overhead rate is calculated in traditional settings and an activity pool rate is calculated in activity-based costing settings. If a rate is calculated before an accounting period begins, managers can better estimate the product costs by applying manufacturing overhead costs in the same way to all units of production during the year. For example, using a single, plantwide overhead rate requires the grouping of all estimated manufacturing overhead costs into one cost pool with direct labor hours or machine hours as the cost driver. No journal entry is required because no business activity has taken place.

STEP 2 In Step 2, the application step, the estimated manufacturing overhead costs are assigned to the product's costs as units are manufactured. The actual cost driver level (for example, the actual number of direct labor hours used to complete the product) is multiplied by the predetermined manufacturing overhead rate or activity pool rate for that cost driver. The purpose of this calculation is to assign a fairly consistent manufacturing overhead cost to each unit produced during the accounting period. The allocation, or application, of overhead to the product is recorded by increasing the Work in Process Inventory account and reducing the Manufacturing Overhead account.

STEP 3 Step 3, the recording step, occurs during the accounting period when the actual manufacturing overhead costs are recorded as they are incurred. These costs will be part of the actual product cost and include the costs of indirect materials, indirect labor, depreciation, property taxes, and other production costs. Recording the actual manufacturing overhead costs requires an increase in the Manufacturing Overhead account and a decrease in asset accounts or an increase in contra-asset or liability accounts.

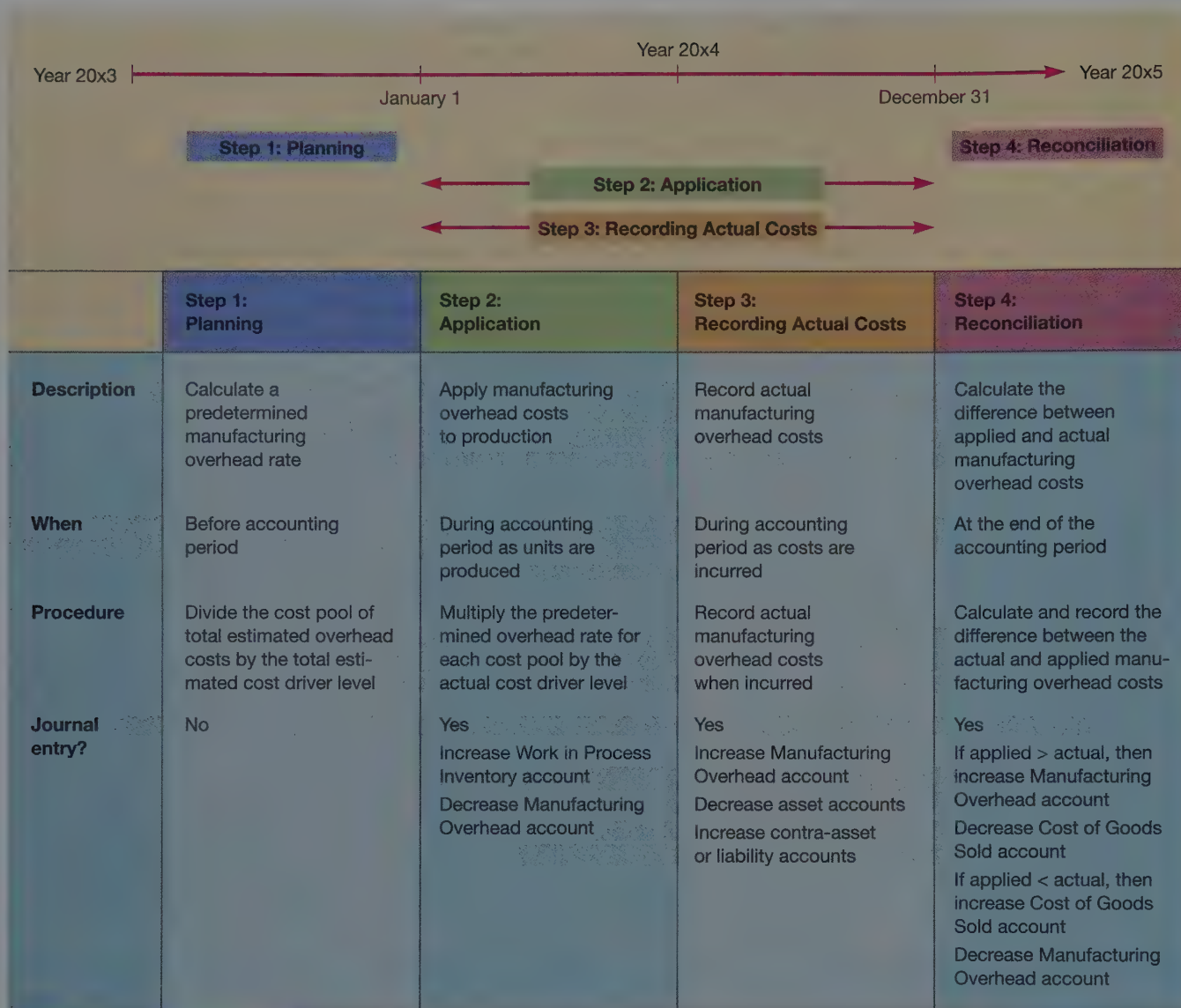


Figure 6
The Manufacturing Overhead Allocation Process

STEP 4 At the end of the accounting period, during Step 4, the reconciliation step, the difference between the applied manufacturing overhead costs and the actual manufacturing overhead costs is calculated. If the manufacturing overhead costs applied to production during the accounting period are greater than (over) the actual manufacturing overhead costs, the difference in the amounts represents overapplied overhead costs. The Manufacturing Overhead account is increased and the Cost of Goods Sold account is decreased by this difference, assuming the difference is not material. If the difference is material, adjustments are made to the Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold accounts. If the manufacturing overhead costs applied to production during the accounting period are less than (under) the actual manufacturing overhead costs, the difference in the amounts represents underapplied overhead costs. The Cost of Goods Sold account is increased and the Manufacturing Overhead account is decreased by this difference, assuming the difference is not material. The adjustment for overapplied or underapplied overhead costs, whether it is immaterial or material, is necessary to reflect the actual manufacturing overhead costs on the income statement.

The Importance of Good Estimates

A predetermined manufacturing overhead rate has two main uses. First, it enables managers to make more timely decisions about pricing products and controlling costs. The product cost calculated at the end of the period, when all of the product costs are known, is more accurate. However, when the overhead portion of product cost is estimated in advance, managers can compare actual and estimated costs throughout the year and more quickly correct any problems that may have caused the under- or overallocation of overhead costs. Second, an advance estimate allows the management accountant to apply manufacturing overhead costs more equitably to each unit produced.

Actual manufacturing overhead costs fluctuate from month to month as a result of the timing of the costs and the variability of the amounts. For example, some manufacturing overhead costs (such as supervisors' salaries and depreciation on equipment) may be expensed monthly. Others (like payroll taxes) may be paid quarterly, and still others (like property taxes and insurance) may be paid annually. In addition, hourly indirect labor costs (such as machine maintenance and material handling) fluctuate with changes in production levels.

The successful allocation of manufacturing overhead costs depends on two factors. One is a careful estimate of the total manufacturing overhead costs. The other is a good forecast of the activity used as the cost driver.

It is crucial to develop an accurate estimate of total manufacturing overhead costs. If the estimate is wrong, the manufacturing overhead rate will be wrong. This will cause an overstatement or understatement of the product unit cost. If an organization relies on overstated product unit cost information, it may fail to bid on profitable projects because the costs appear too high. If an organization relies on understated product unit cost information, it may accept business that is not as profitable as expected. So, to provide managers with reliable product unit costs, the management accountant must be careful to include all manufacturing overhead items and to forecast the costs of those items accurately.

The budgeting process usually includes estimated manufacturing overhead costs. Managers who use production-related resources will provide cost estimates for direct and indirect production activities. For example, the managers for material handling and inspecting at Angelo's Rolling Suitcases, Inc., can estimate the costs related to their departments' activities. Jamie Estrada, the accountant, then includes their cost estimates in developing total manufacturing overhead costs. In addition, the managers need to carefully estimate the cost driver level. An understated cost driver level will cause an overstatement of the predetermined manufacturing overhead rate (the cost is spread over a lesser level), and an overstated cost driver level will cause an understatement of the predetermined manufacturing overhead rate (the cost is spread over a greater level).

In the remaining portion of this chapter, we will present two approaches to applying or assigning manufacturing overhead. We will use the first two steps of the four-step overhead allocation process to demonstrate those approaches.

Manufacturing Overhead Allocation Using the Traditional Approach

OBJECTIVE

7 Calculate product unit cost using the traditional allocation of manufacturing overhead costs

Many organizations continue to use one predetermined overhead rate to apply manufacturing overhead to a product cost. This approach is especially useful if companies manufacture only one product or a few very similar products that require the same production processes and production-related activities, such as setup, inspection, and material handling. The total manufacturing overhead costs represent one cost pool, and a traditional activity base, such as direct labor hours, direct labor costs, machine hours, or units of production, becomes the cost driver.

Figure 7
Using the Traditional Approach to
Assign Manufacturing Overhead
Costs to Production

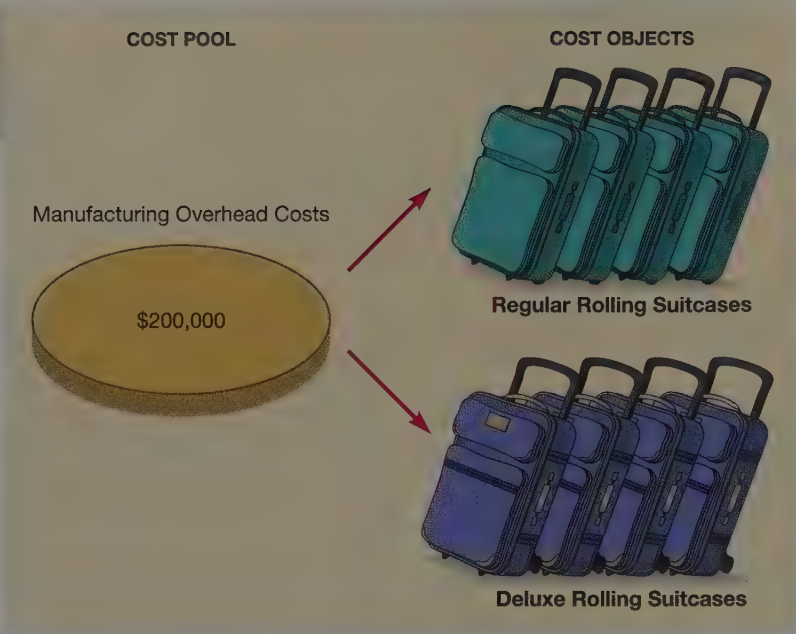


Figure 7 illustrates the application of one cost pool of manufacturing overhead costs to two product lines. As we continue with our example of Angelo’s Rolling Suitcases, Inc., let’s assume that Angelo’s will be selling two product lines in 20x5, a regular model and a deluxe model. The deluxe model has additional pockets, a wider handle that locks in a closed position, and a larger main storage area. Suppose that Jamie Estrada chooses direct labor hours as the cost driver. For the next year, Estrada estimates that manufacturing overhead costs will amount to \$200,000 and that total direct labor hours (DLH) worked will be 40,000 hours.

STEP 1 The first step using the traditional approach is to compute the predetermined overhead rate, as shown in Step 1 of Table 4:

$$\text{Predetermined Overhead Rate} = \frac{\$200,000}{40,000 \text{ Direct Labor Hours}} = \$5 \text{ per Direct Labor Hour}$$

STEP 2 The second step is to apply manufacturing overhead to the products (see Table 4). During the year, 25,000 direct labor hours were used to produce 10,000 regular rolling suitcases and 15,000 direct labor hours were used to produce 5,000 deluxe rolling suitcases. When Estrada used the predetermined overhead rate, the portion of the manufacturing overhead cost applied to the regular rolling suitcases totaled \$125,000 (\$5 × 25,000 DLH), or \$12.50 per unit (\$125,000 ÷ 10,000 units), and the portion applied to the deluxe rolling suitcases totaled \$75,000 (\$5 × 15,000 DLH), or \$15.00 per unit (\$75,000 ÷ 5,000 units).

Estrada also wanted to calculate the normal product unit cost during the accounting period. She gathered the following data for the two product lines:

	Regular Rolling Suitcase	Deluxe Rolling Suitcase
Actual direct materials cost per unit	\$40.00	\$42.00
Actual direct labor cost per unit	37.50	45.00
Prime cost per unit	<u>\$77.50</u>	<u>\$87.00</u>

Table 4. Assignment of Manufacturing Overhead Costs and Calculation of Product Unit Cost: Traditional Approach

Step 1. Calculate the predetermined overhead rate.

Cost Pool Description	Estimated Cost Pool Amount	Cost Driver	Cost Driver Level	Predetermined Overhead Rate
Manufacturing overhead	\$200,000	Direct labor hours (DLH)	40,000 DLH	\$5 per DLH

Step 2. Apply manufacturing overhead costs to production.

Cost Pool Description	Regular		Deluxe	
	Cost Driver Level	Cost Applied	Cost Driver Level	Cost Applied
Overhead costs applied:				
Manufacturing overhead: \$5 per DLH	× 25,000 DLH	\$125,000	× 15,000 DLH	\$75,000
Number of units		÷ 10,000		÷ 5,000
Manufacturing overhead cost per unit		<u>\$ 12.50</u>		<u>\$ 15.00</u>

Product Unit Cost		
	Regular Rolling Suitcase	Deluxe Rolling Suitcase
Product costs per unit:		
Direct materials	\$40.00	\$ 42.00
Direct labor	37.50	45.00
Manufacturing overhead	12.50	15.00
Product unit cost	<u>\$90.00</u>	<u>\$102.00</u>

At the bottom of Table 4 is Estrada's calculation of the product unit cost for each product line. The deluxe model's product unit cost of \$102.00 is higher than the regular model's product unit cost of \$90.00 because the deluxe model required more expensive materials and more labor time.

Manufacturing Overhead Allocation Using ABC

OBJECTIVE

8 Calculate product unit cost using activity-based costing to assign manufacturing overhead costs

Activity-based costing (ABC) is a method of assigning costs that calculates a more accurate product cost by categorizing all indirect costs by activity, tracing the indirect costs to those activities, and assigning activity costs to products using a cost driver that is related to the cause of the cost. A company that uses ABC to assign manufacturing overhead costs to products identifies production-related activities and the events and circumstances that cause, or drive, those activities, such as number of inspections, number of moves, or maintenance hours. As a result, many smaller activity pools are created from the single manufacturing overhead cost pool that was traditionally used. This means that managers will calculate a predetermined overhead rate, or activity cost rate, for each activity pool and then use that rate and a cost driver amount to determine the portion of manufacturing overhead costs to assign to a product. Managers must select an appropriate number of activity pools for manufacturing overhead. Because each activity pool requires a cost driver, the benefit of grouping manufacturing overhead costs into several

FOCUS ON BUSINESS PRACTICE

A common challenge for companies implementing activity-based costing (ABC) is to limit the number of cost drivers used for overhead cost allocation. The management accountants at Dayton Technologies, an extruded-plastics business unit of Alcoa, have developed an ABC model that includes 11 cost pools using 11 different cost drivers. The initial design included 40 cost drivers, but the number was reduced to 11 for the following reasons:

- Constraints of data availability and collectibility

- Difficulty in managing a large number of drivers in the model
- Practical relevance of the cost driver to the users of the ABC information

The model reports an ABC contribution margin for the company's products and customers. The ABC contribution margin equals the total sales minus variable costs minus other directly traceable costs identified by the ABC system. The calculation of the ABC contribution margin includes approximately 80 percent of the total costs. Dayton Technologies uses the ABC contribution margin to improve decisions about keeping or dropping product lines and negotiating future business with customers.³

smaller pools to obtain more accurate product costs is offset by the additional costs of measuring many different cost drivers. A system must be designed to capture the actual cost driver amounts.

ABC will improve the accuracy of product costs for organizations that sell many different types of products (product diversity) or use varying, significant amounts of different production-related activities to complete the products (process complexity). To remain competitive in our current global marketplace, many organizations are selling a wider range of products or services (product or service diversity). For example, 20 years ago, Taco Bell carried only six food items. Today the menu at Taco Bell offers more than 25 food items. This diversity of product lines requires more careful cost allocation, especially when it comes to making decisions about pricing products, outsourcing processes to other organizations, or choosing to keep a food item or drop it from the menu.

For other organizations, some products are more complicated to manufacture, store, move, package, or ship than others (process complexity). For example, an auto parts distributor receives, stores, picks, moves, consolidates, packs, and ships auto parts to auto dealers. The distributor's greatest costs are overhead costs, which under the traditional method are assigned based on the cost to purchase a part for resale. Under this system, more expensive parts, such as car radios, receive a greater allocation of overhead costs than do less expensive parts, such as windshields. However, compared to a car radio, a glass windshield, because it is delicate, costs the distributor more to move, store, pack, and ship. If ABC were used, the cost of the windshield would increase to reflect a fairer allocation of the distributor's overhead costs. Thus, ABC, by assigning overhead costs based on the relative use of overhead resources, would provide managers with better information for making decisions, such as pricing car radios, windshields, and other auto parts; choosing to discontinue selling windshields; or reducing the amount of storage space.

Figure 8 illustrates the use of ABC to assign manufacturing overhead costs to two product lines. Earlier in the chapter, Jamie Estrada, the accountant for Angelo's Rolling Suitcases, Inc., calculated product unit cost by computing one manufacturing overhead rate for one cost pool and applying that rate to the direct labor hours used to manufacture the regular and deluxe rolling suitcase models. As we continue with our example, we find that Angelo Sanchez is concerned about the product cost for each model. Sanchez believes that the difference in cost between the regular and deluxe models should be more than \$12. He has asked Estrada to review her estimate. Estrada found no error when she rechecked the cal-

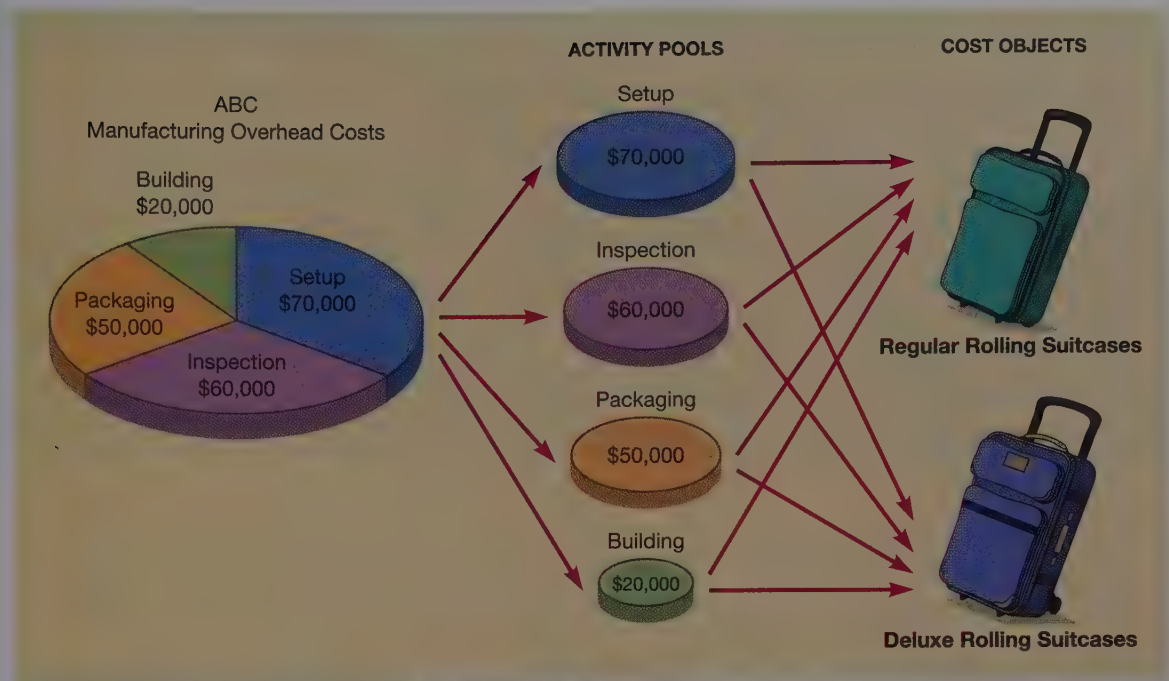


Figure 8
Using ABC to Assign Manufacturing Overhead Costs to Production

culuation of direct materials costs and direct labor costs. However, she believes the traditional approach to assigning manufacturing overhead cost could be misleading, so she wants to use activity-based costing to obtain a more accurate product cost.

Estrada analyzed the production-related activities and decided that the estimated \$200,000 in manufacturing overhead cost could be grouped into four activity pools. The first activity, setup, includes estimated total costs of \$70,000 for indirect labor and indirect materials used in preparing machines for each batch of production. The second activity, inspection, includes \$60,000 for salaries and costs of indirect materials, indirect labor, and depreciation on testing equipment. Packaging, the third activity, includes estimated total costs of \$50,000 for indirect materials, indirect labor, and equipment depreciation. The last activity, building, includes estimated total overhead costs of \$20,000 for building depreciation, maintenance, janitorial wages, property taxes, insurance, security, and all other costs not related to the first three activities.

After identifying the four activity pools, Estrada selected a cost driver and estimated the cost driver level for each activity pool. The following schedule shows those amounts by product line and in total.

Cost Driver	Estimated Cost Driver Level		
	Regular	Deluxe	Total
Number of setups	300	400	700
Number of inspections	150	350	500
Packaging hours	600	1,400	2,000
Machine hours	4,000	6,000	10,000

STEP 1 After identifying activity pools, estimated activity pool amounts, cost drivers, and estimated cost driver levels, Estrada performed Step 1 of the overhead allocation process by calculating the activity cost rate for each activity pool. The activity cost rate is the estimated activity pool amount divided by the estimated

Table 5. Assignment of Manufacturing Overhead Costs and Calculation of Product Unit Cost: ABC Approach

Step 1. Calculate the overhead activity cost rates.

Activity Pool	Estimated Activity Pool Amount	Cost Driver	Cost Driver Level	Activity Cost Rate
Setup	\$ 70,000	Number of setups	700 setups	\$100 per setup
Inspection	60,000	Number of inspections	500 inspections	\$120 per inspection
Packaging	50,000	Packaging hours	2,000 packaging hours	\$ 25 per packaging hour
Building	20,000	Machine hours	10,000 machine hours	\$ 2 per machine hour
	<u>\$200,000</u>			

Step 2. Apply manufacturing overhead costs to production.

Activity Pool	Activity Cost Rate	Regular		Deluxe	
		Cost Driver Level	Cost Applied	Cost Driver Level	Cost Applied
Setup	\$100 per setup	× 300 setups	\$30,000	× 400 setups	\$ 40,000
Inspection	\$120 per inspection	× 150 inspections	18,000	× 350 inspections	42,000
Packaging	\$ 25 per packaging hour	× 600 packaging hours	15,000	× 1,400 packaging hours	35,000
Building	\$ 2 per machine hour	× 4,000 machine hours	8,000	× 6,000 machine hours	12,000
Total			<u>\$71,000</u>		<u>\$129,000</u>
Number of units			÷ 10,000		÷ 5,000
Manufacturing overhead cost per unit			<u>\$ 7.10</u>		<u>\$ 25.80</u>

Product Unit Cost

	Regular Rolling Suitcase	Deluxe Rolling Suitcase
Product costs per unit:		
Direct materials	\$40.00	\$ 42.00
Direct labor	37.50	45.00
Manufacturing overhead	7.10	25.80
Product unit cost	<u>\$84.60</u>	<u>\$112.80</u>

cost driver level. Step 1 of Table 5 shows the activity cost rates to be \$100 per setup, \$120 per inspection, \$25 per packaging hour, and \$2 per machine hour.

STEP 2 In Step 2, Estrada applied manufacturing overhead to the two product lines using the cost driver level for each cost driver multiplied by the activity cost rate shown in the preceding schedule. Step 2 of Table 5 shows those calculations. For example, during the year, Estrada applied \$30,000 in setup costs ($\100×300 setups) to the regular model and \$40,000 ($\100×400 setups) to the deluxe model. After applying the overhead costs from the four activity pools to the product lines, Estrada estimated that total manufacturing overhead costs of \$71,000, or \$7.10 per suitcase ($\$71,000 \div 10,000$ units), should be applied to the regular

FOCUS ON BUSINESS TECHNOLOGY



Walker Interactive Systems, Inc., a financial software organization, uses computer mainframes, client/server systems, Internet browsers on desktops, and network computing to help multimillion-dollar organizations manage vast amounts of information that is accessed frequently by suppliers, employees, and customers. Organizations in the utility industry as well as



the packaged goods, transportation, banking, insurance, and telecommunications fields need to translate accounting data into business information for decision making. For example, Ryder Systems, Inc., uses a general ledger software package designed by Walker to analyze the profitability of each of its trucks and routes. Walker also helps some organizations use electronic data interchange (EDI) and Internet technology to assist their customers in making payments on their accounts and to allow their suppliers to check the payment status of their invoices.⁴

model and \$129,000, or \$25.80 per suitcase ($\$129,000 \div 5,000$ units), should be applied to the deluxe model.

Estrada also wanted to calculate the normal product unit cost for the accounting period. At the bottom of Table 5 is Estrada's calculation of the product unit cost for each product line. The product unit cost is \$84.60 for the regular model and \$112.80 for the deluxe model.

Estrada presented the following information to Angelo Sanchez:

	Regular Rolling Suitcase	Deluxe Rolling Suitcase
Product unit cost: One manufacturing overhead cost pool	\$90.00	\$102.00
Product unit cost: ABC with four activity pools	<u>84.60</u>	<u>112.80</u>
Difference: decrease (increase)	<u>\$ 5.40</u>	<u>(\$ 10.80)</u>

Because ABC fairly assigned more costs to the product line that used more resources, it provided a more accurate estimate of product unit cost. The increased information about the production requirements for the deluxe model that went into the ABC calculation of product unit cost also provided valuable insights. Sanchez found that the deluxe model costs more to manufacture because it requires (1) more setups and machine hours because of the changes in the handle and number of pockets, (2) more inspections to test the new handle, and (3) more hours to complete special packaging requirements that allow retailers to display the rolling suitcase in a carry-on package at stores in airport terminals. The product unit cost of the deluxe model is higher because the product requires more production and production-related activities to be completed and ready for sale. Based on this analysis, Sanchez may want to reconsider some of his short-term decisions about the manufacture and sale of his two product lines.

Cost Allocation in Service Organizations

OBJECTIVE

9 Apply costing concepts to a service organization

Many organizations provide services to other organizations or to the general public. Services are labor-intensive processes supported by indirect labor and overhead costs. Managers of service organizations need to classify costs in different ways

depending on the purpose of the analysis. The owner of a tax-preparation service, for example, might like to trace costs to the preparation of particular types of returns, such as personal tax returns, payroll tax reports, and estate tax returns. This would allow her to evaluate the profitability of each type of service. The manager of a nursery might classify the costs of a landscaping service into variable and fixed components to calculate the minimum number of landscaping projects needed to achieve a targeted profit. The direct labor costs for tax-preparation or landscaping work would be a value-adding cost to those respective services.

Processing loans, representing people in courts of law, selling insurance policies, and computing people's income taxes are examples of typical services performed by professionals. Because no products are manufactured in the course of providing these kinds of services, service organizations have no direct materials costs. Nonetheless, specific costs arise that must be included when computing the cost of providing a service.

The most important cost in a service organization is the professional labor involved, and the usual standard is applicable; that is, the direct labor cost must be traceable to the service rendered. In addition to labor cost, any type of organization—whether manufacturing, retail, service, or not-for-profit—incurs overhead costs. In a service organization, the overhead costs incurred for the purpose of offering a service are classified as service overhead (like manufacturing overhead) and, along with professional labor costs, are considered service costs (like product costs) rather than period costs.

For example, assume that the Loan Department at the Seminole Bank of Commerce wants to determine the total costs incurred in processing a typical loan application. Its policy for the past five years has been to charge a \$150 fee for processing a home-loan application. Barbara Hasegawa, the chief loan officer, thinks the fee is far too low. Because of the way operating costs have soared in the past five years, she proposes that the fee be doubled. You have been asked to compute the cost of processing a typical home-loan application.

The following information about the processing of loan applications has been given to you.

Direct professional labor:

Loan processors' monthly salaries:	
4 people at \$3,000 each	<u>\$12,000</u>

Indirect monthly Loan Department overhead costs:

Chief loan officer's salary	\$ 4,500
Telephone	750
Depreciation	5,750
Legal advice	2,460
Customer relations	640
Credit check function	1,980
Internal audit function	2,400
Utilities	1,690
Clerical personnel	3,880
Miscellaneous	<u>1,050</u>
Total overhead costs	<u>\$25,100</u>

One hundred home-loan applications are usually processed by the Loan Department each month.

The Loan Department performs several other functions in addition to processing home-loan applications. Roughly one-half of the department is involved in loan collection. After determining how many of the processed loans were not home loans, you conclude that only 25 percent of the overhead costs of the Loan

Department were applicable to the processing of home-loan applications. The cost of processing one home-loan application can be computed as follows:

Direct professional labor cost:	
$\$12,000 \div 100$	\$120.00
Service overhead cost:	
$\$25,100 \times 25\% \div 100$	62.75
Total processing cost per loan	<u>\$182.75</u>

Finally, you conclude that the chief loan officer was correct; the present fee does not cover the current costs of processing a typical home-loan application. However, doubling the loan fee seems too extreme. To allow for a profit margin, the loan fee could be raised to \$225 or \$250.

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

- 1. State how managers use information about costs in the management cycle.** Managers use information about costs as they prepare budgets, make pricing and other decisions during the management cycle. Managers in manufacturing, retail, and service organizations use information about operating costs and product costs in ways that are appropriate to their specific business to measure historical profits or estimate future profits, to decide the selling price for regular or special sales or services provided, and to value finished goods or merchandise inventories.
- 2. Identify various approaches managers use to classify costs.** A single cost item can be classified and used by managers to (1) trace costs to cost objects (direct versus indirect costs), (2) calculate the number of units that must be sold to obtain a certain level of profit (variable versus fixed costs), (3) identify costs of activities that do and do not add value to a product or service (value-adding versus nonvalue-adding costs), or (4) prepare an income statement for outside parties (product versus period costs).
- 3. Define and give examples of the three elements of product cost and compute a product unit cost for a manufacturing organization.** Direct materials are materials that become part of the finished product and that can be conveniently and economically traced to specific product units. The sheet metal used to manufacture cars is an example of a direct material. Direct labor costs include all labor costs for specific work that can be conveniently and economically traced to specific product units. A machine operator's wages are a direct labor cost. All other production-related costs—for utilities, depreciation on equipment, and operating supplies, for example—are classified and accounted for as manufacturing overhead costs. Such costs cannot be conveniently or economically traced to end products, so a cost allocation method is used to assign them to products.
The unit cost of a product is made up of the costs of direct materials, direct labor, and manufacturing overhead. These three cost elements are accumulated for a batch of products as they are produced. When the batch has been completed, the product unit cost is computed by either (1) dividing the total cost of direct materials, direct labor, and manufacturing overhead by the total number of units produced or (2) determining the cost per unit for each element of the

product cost and summing those per-unit costs. The product unit cost will include estimated costs if a normal or standard costing method is used. Under normal costing, the *actual* costs of direct materials and direct labor are combined with the *estimated* cost of manufacturing overhead to determine the normal product unit cost. Under standard costing, the *estimated* costs of direct materials, direct labor, and manufacturing overhead are used to calculate the standard product unit cost. The components of product cost may be classified as prime costs or conversion costs. Prime costs are the primary costs of production, or the sum of direct materials costs and direct labor costs. Conversion costs are the costs of converting direct materials into finished product, or the sum of direct labor costs and manufacturing overhead costs.

4. Describe the flow of product-related activities, documents, and costs through the Materials Inventory, Work in Process Inventory, and Finished Goods inventory accounts.

The flow of costs through the inventory accounts begins when costs are incurred for direct materials, direct labor, and manufacturing overhead. Materials costs flow first into the Materials Inventory account, which is used to record the costs of materials when they are received and again when they are issued for use in a production process. All manufacturing-related costs—direct materials, direct labor, and manufacturing overhead—are recorded in the Work in Process Inventory account as the production process begins. When products are completed, their costs are transferred from the Work in Process Inventory account to the Finished Goods Inventory account. Costs remain in the Finished Goods Inventory account until the products are sold, at which time they are transferred to the Cost of Goods Sold account.

5. Prepare a statement of cost of goods manufactured and an income statement for a manufacturing organization.

The cost of goods manufactured is a key component of the income statement for a manufacturing organization. Determining the cost of goods manufactured involves three steps: (1) computing the cost of materials used, (2) computing total manufacturing costs for the period, and (3) computing the cost of goods manufactured. This last figure, taken from the statement of cost of goods manufactured, is used in the income statement to compute the cost of goods sold.

6. Define cost allocation and explain how cost objects, cost pools, and cost drivers are used to apply manufacturing overhead.

Cost allocation is the process of assigning collected indirect costs to specific cost objects using an allocation base that represents a major function of the business. The allocation of manufacturing overhead requires the pooling of manufacturing overhead costs that are affected by a common activity and the selection of a cost driver whose activity level causes a change in the cost pool. A cost pool is a pool of overhead costs related to a cost object (the recipient of an allocated cost). A cost driver is an activity that causes the cost pool to increase in amount as the cost driver increases.

There are four steps in the manufacturing overhead allocation process. In the planning step, the predetermined overhead rate is calculated. In the application step, manufacturing overhead costs are applied to the product costs during production. In the recording actual costs step, the actual manufacturing overhead costs are recorded in the accounting records when the costs are incurred. In the reconciliation step, the difference between the actual and applied manufacturing overhead costs is calculated. The Cost of Goods Sold account is corrected for an immaterial amount of over- or underapplied manufacturing overhead costs assigned to the products. If the difference is material, adjustments are made to the Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold accounts.

- 7. Calculate product unit cost using the traditional allocation of manufacturing overhead costs.** The traditional method applies manufacturing overhead costs to a product's cost by estimating a predetermined manufacturing overhead rate and multiplying that rate by the actual cost driver level. The total applied manufacturing overhead cost is added to the actual costs of direct materials and direct labor to determine the total product cost. The product unit cost is computed by either dividing the total product cost by the total number of units produced or determining the cost per unit for each element of the product cost and summing those per-unit costs.
- 8. Calculate product unit cost using activity-based costing to assign manufacturing overhead costs.** When ABC is used, manufacturing overhead costs are grouped into smaller cost pools related to specific activities. Cost drivers are identified and cost driver levels are estimated for each activity pool. Each activity cost rate is calculated by dividing the estimated activity pool amount by the estimated cost driver level. Manufacturing overhead, which is represented in the activity pools, is applied to the product's cost by multiplying the activity cost rate by the actual cost driver level. The total assigned manufacturing overhead cost is added to the cost of direct materials and direct labor to determine the total product cost. The product unit cost is computed by either dividing the total product cost by the total number of units produced or determining the cost per unit for each element of the product cost and summing those per-unit costs.
- 9. Apply costing concepts to a service organization.** Most types of costs incurred by a manufacturer are also incurred by a service organization. The only important difference is that a service organization does not deal with a physical product that can be assembled, stored, and valued. Services are rendered and cannot be held in inventory. Because no products are manufactured in the course of providing services, service organizations have no materials costs. To determine the cost of performing a particular service, professional labor and service-related overhead costs are included in the analysis.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- L0 8 Activity-based costing:** A method of assigning costs that calculates a more accurate product cost by categorizing all indirect costs by activity, tracing the indirect costs to those activities, and assigning activity costs to products using a cost driver that is related to the cause of the cost.
- L0 3 Actual costing:** A method of cost measurement that uses the actual costs of direct materials, direct labor, and manufacturing overhead to calculate a product unit cost.
- L0 3 Conversion costs:** The costs of converting direct materials into finished product, the sum of direct labor costs and manufacturing overhead costs.
- L0 6 Cost allocation:** The process of assigning or applying collected indirect costs to specific cost objects using an allocation base that represents a major function of the business.
- L0 6 Cost driver:** An activity that causes the cost pool to increase in amount as the cost driver increases in volume.
- L0 6 Cost object:** The destination of an assigned, or allocated, cost.
- L0 4 Cost of goods manufactured:** The cost of all units completed and moved to finished goods storage during an accounting period.
- L0 6 Cost pool:** A collection of similar overhead costs that are related to a cost object (a production-related activity).
- L0 2 Direct cost:** Any cost that can be conveniently or economically traced to a specific cost object.

- L0 3 Direct labor costs:** The costs of labor to complete production activities that can be conveniently and economically traced to specific units of product.
- L0 3 Direct materials costs:** The costs of materials that can be conveniently and economically traced to specific units of product.
- L0 4 Finished Goods Inventory account:** An inventory account that holds the costs assigned to all completed products that have not been sold.
- L0 2 Fixed cost:** A cost that remains constant within a defined range of activity or time period.
- L0 2 Indirect cost:** Any cost that cannot be conveniently or economically traced to a specific cost object.
- L0 3 Indirect labor costs:** Labor costs for production-related activities that cannot be conveniently or economically traced to a unit of product.
- L0 3 Indirect materials costs:** The costs of materials that cannot be conveniently or economically traced to a unit of product.
- L0 4 Manufacturing cost flow:** The flow of manufacturing costs (direct materials, direct labor, and manufacturing overhead) from their incurrence through the Materials Inventory, Work in Process Inventory, and Finished Goods Inventory accounts to the Cost of Goods Sold account.
- L0 3 Manufacturing overhead costs:** Production-related costs that cannot be practically or conveniently traced to an end product. Also called *factory overhead*, *factory burden*, or *indirect manufacturing costs*.
- L0 4 Materials Inventory account:** An inventory account that holds the balance of the cost of unused materials.
- L0 2 Nonvalue-adding cost:** The cost of an activity that adds cost to a product or service but does not increase its market value.
- L0 3 Normal costing:** A method of cost measurement that combines *actual* direct materials and direct labor costs with *estimated* manufacturing overhead costs to determine a normal product unit cost.
- L0 2 Period costs:** The costs of resources consumed during the current period and not assigned to products. Also called *noninventoriable costs*.
- L0 3 Prime costs:** The primary costs of production, the sum of direct materials costs and direct labor costs.
- L0 2 Product costs:** The costs assigned to inventory, which include the costs of direct materials, direct labor, and manufacturing overhead. Also called *inventoriable costs*.
- L0 3 Product unit cost:** The manufacturing cost of a single unit of product, computed by either (1) dividing the total cost of direct materials, direct labor, and manufacturing overhead by the total number of units produced or (2) determining the cost per unit for each element of the product cost and summing those per-unit costs.
- L0 3 Standard costing:** A method of cost measurement that uses the estimated costs of direct materials, direct labor, and manufacturing overhead to calculate the standard product unit cost for purposes of cost control.
- L0 5 Statement of cost of goods manufactured:** A formal statement summarizing the flow of all manufacturing costs incurred during an accounting period.
- L0 4 Total manufacturing costs:** The total costs of direct materials, direct labor, and manufacturing overhead incurred and transferred to work in process inventory during an accounting period.
- L0 2 Value-adding cost:** The cost of an activity that increases the market value of a product or service.
- L0 2 Variable cost:** A cost that changes in direct proportion to a change in productive output (or any other measure of volume).
- L0 4 Work in Process Inventory account:** An inventory account used to record the manufacturing costs incurred and assigned to partially completed units of product.

REVIEW PROBLEM

LO 3

LO 4

LO 5

Cost of Goods Manufactured—Three Fundamental Steps

In addition to the year-end balance sheet and income statement, the management of Nikita Company requires the controller to prepare a statement of cost of goods manufactured. During 20x3, \$361,920 of direct materials were purchased. Operating cost data and inventory account balances for 20x3 follow:

Account	Balance
Direct Labor (10,430 hours at \$9.50 per hour)	\$ 99,085
Plant Supervision	42,500
Indirect Labor (20,280 hours at \$6.25 per hour)	126,750
Factory Insurance	8,100
Utilities, Factory	29,220
Depreciation, Factory Building	46,200
Depreciation, Factory Equipment	62,800
Factory Security	9,460
Factory Repair and Maintenance	14,980
Selling and Administrative Expenses	76,480
Materials Inventory, December 31, 20x2	26,490
Work in Process Inventory, December 31, 20x2	101,640
Finished Goods Inventory, December 31, 20x2	148,290
Materials Inventory, December 31, 20x3	24,910
Work in Process Inventory, December 31, 20x3	100,400
Finished Goods Inventory, December 31, 20x3	141,100

REQUIRED

1. Compute the cost of materials used during the year.
2. Given the cost of materials used, compute the total manufacturing costs for the year.
3. Given the total manufacturing costs for the year, compute the cost of goods manufactured during the year.
4. Assuming 13,397 units were manufactured during the year, what was the actual product unit cost?

ANSWER TO REVIEW PROBLEM

1. Compute the cost of materials used.

Materials Inventory, December 31, 20x2	\$ 26,490
Add Direct Materials Purchased (net)	361,920
Cost of Materials Available for Use	<u>\$388,410</u>
Less Materials Inventory, December 31, 20x3	24,910
Cost of Materials Used	<u><u>\$363,500</u></u>

2. Compute the total manufacturing costs.

Cost of Materials Used	\$363,500
Add Direct Labor Costs	99,085
Add Total Manufacturing Overhead Costs	
Plant Supervision	\$ 42,500
Indirect Labor	126,750
Factory Insurance	8,100
Utilities, Factory	29,220
Depreciation, Factory Building	46,200
Depreciation, Factory Equipment	62,800
Factory Security	9,460
Factory Repair and Maintenance	14,980
Total Manufacturing Overhead Costs	<u>340,010</u>
Total Manufacturing Costs	<u><u>\$802,595</u></u>

3. Compute the cost of goods manufactured.

Total Manufacturing Costs	\$802,595
Add Work in Process Inventory, December 31, 20x2	101,640
Total Cost of Work in Process During the Year	\$904,235
Less Work in Process Inventory, December 31, 20x3	100,400
Cost of Goods Manufactured	<u>\$803,835</u>

4. Compute the actual product unit cost.

$$\frac{\text{Cost of Goods Manufactured}}{\text{Number of Units Manufactured}} = \frac{\$803,835}{13,397} = \$60^*$$

*Rounded.

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

- How do managers use information about costs?
- Why do managers use different classifications of costs?
- What is the difference between a direct cost and an indirect cost?
- What is the difference between a value-adding cost and a nonvalue-adding cost?
- What are product costs? period costs?
- What are the three kinds of costs included in a product's cost?
- What characteristics identify a cost as part of manufacturing overhead?
- Explain the difference between actual costing and normal costing.
- What is the difference between prime costs and conversion costs?
- Identify and describe the three inventory accounts used by a manufacturing company.
- What is meant by the term *manufacturing cost flow*?
- Describe how total manufacturing costs differ from the cost of goods manufactured.
- How is the cost of goods manufactured used in computing the cost of goods sold?
- What is cost allocation?
- Explain the relationship between cost objects, cost pools, and cost drivers. Give an example of each.
- List the four steps of the manufacturing overhead allocation process. Briefly explain each step.
- What are two main uses of a predetermined manufacturing overhead rate?
- How does traditional overhead allocation differ from ABC overhead allocation?
- In ABC, what measure is used to relate an activity pool to a cost object? Explain.
- "The concept of product costs is not applicable to service organizations." Is this statement correct? Defend your answer.

SHORT EXERCISES

- SE 1.** Indicate whether each of the following is a direct (D) or an indirect (ID) cost and a variable (V) or a fixed (F) cost. Also indicate whether each adds value (VA) or does not add value (NVA) to the product and whether each is a product cost (PD) or a period cost (PER) or neither (N).

- Production supervisor's salary
- Sales commission
- Wages of a production line worker

LO 2 Cost Classification

- LO 3 Elements of Manufacturing Cost** **SE 2.** Flora Rose, the bookkeeper at Candlelight, Inc., must group the costs to manufacture candles. Tell whether each of the following items should be classified as direct materials (DM), direct labor (DL), manufacturing overhead (MO), or none of these (N). Also indicate whether each is a prime cost (PC), a conversion cost (CC), or neither (N).
1. Depreciation of the cost of vats to hold melted wax
 2. Cost of wax
 3. Rent on the factory where candles are made
 4. Cost of George's time to dip the wicks into the wax
 5. Cost of coloring for candles
 6. Cost of Ray's time to design candles for Halloween
 7. Sam's commission to sell candles to Candles Plus
- LO 3 Computing Product Unit Cost** **SE 3.** What is the product unit cost for Job 14, which consists of 300 units and has total manufacturing costs of direct materials, \$4,500; direct labor, \$7,500; and manufacturing overhead, \$3,600? What are the prime cost and conversion cost per unit?
- LO 4 Manufacturing Cost Flow** **SE 4.** Given the following information, compute the ending balances of the Materials Inventory, Work in Process Inventory, and Finished Goods Inventory accounts?
- | | |
|--|-----------|
| Materials Inventory, beginning balance | \$ 23,000 |
| Work in Process Inventory, beginning balance | 25,750 |
| Finished Goods Inventory, beginning balance | 38,000 |
| Direct materials purchased | 85,000 |
| Direct materials placed into production | 74,000 |
| Direct labor costs | 97,000 |
| Manufacturing overhead costs | 35,000 |
| Cost of goods completed | 123,000 |
| Cost of goods sold | 93,375 |
- LO 4 Document Flows for a Manufacturing Organization** **SE 5.** Identify the document needed to support each of the following transactions.
1. Placing an order for direct materials with a supplier
 2. Recording direct labor time at the beginning and end of each work shift
 3. Receiving direct materials at the shipping dock
 4. Recording the costs of a specific job requiring direct materials, direct labor, and overhead
 5. Issuing direct materials into production
 6. Billing the customer for a completed order
 7. A request from the Production Scheduling Department for the purchase of direct materials
- LO 5 Income Statement for a Manufacturing Organization** **SE 6.** Using the following information from C.L.I.N.T. Company, prepare an income statement for 20x2.
- | | |
|---|-----------|
| Sales | \$900,000 |
| Finished Goods Inventory, December 31, 20x1 | 45,000 |
| Cost of Goods Manufactured | 585,000 |
| Finished Goods Inventory, December 31, 20x2 | 60,000 |
| Operating Expenses | 270,000 |
| Interest Expense | 5,000 |
- LO 6 Calculation of Underapplied or Overapplied Overhead** **SE 7.** At year end, records show that actual manufacturing overhead costs incurred were \$25,870 and the amount of manufacturing overhead costs applied to production was \$27,000. Identify the amount of under- or overapplied manufacturing overhead and indicate whether the Cost of Goods Sold account should be increased or decreased to adjust the balance to reflect actual manufacturing overhead costs.
- LO 6 Computation of** **SE 8.** Compute the predetermined overhead rate per service request for the Maintenance Department if estimated overhead costs are \$18,290 and the number of estimated service requests is 3,100.
- LO 7 Predetermined Overhead Rate**

LO 6 Allocation of Manufacturing Overhead to Production

SE 9. Calculate the amount of manufacturing overhead costs applied to production if the predetermined overhead rate is \$4 per direct labor hour and 1,200 direct labor hours were worked.

LO 8 Activity-Based Costing and Cost Drivers

SE 10. Kloezeman Clothiers Company relies on the information from its activity-based costing system when setting prices for its products. Compute ABC rates from the following estimated data for each of the activity centers.

	Estimated Activity Pool Amount	Cost Driver Level
Cutting/Stitching	\$5,220,000	145,000 machine hours
Trimming/Packing	998,400	41,600 operator hours
Designing	1,187,500	62,500 designer hours

LO 9 Unit Costs in a Service Business

SE 11. Pickerson's Picking Services provides inexpensive, high-quality labor for farmers growing vegetable and fruit crops. In June, Pickerson's Picking Services paid laborers \$4,000 to harvest 500 acres of winter-grown onions. The company incurred overhead costs of \$2,400 for onion- and lettuce-picking services in June. This amount included the costs of transporting the laborers to the fields; of providing facilities, food, and beverages for the laborers; and of scheduling, billing, and collecting from the farmers. Of this amount, 50 percent was related to picking onions. Compute the cost per acre to pick onions.

EXERCISES

LO 1 The Management Cycle and Operating Costs

E 1. Identify each of the following activities as taking place during either the planning (P) stage, executing (E) stage, reviewing (RV) stage, or reporting (RP) stage of the management cycle.

- Changing regular price to clearance price
- Communicating results to appropriate personnel
- Preparing budgets of operating costs
- Comparing estimated and actual costs to determine variances

LO 2 Cost Classifications

E 2. Tell whether each of the following costs for a bicycle manufacturer is a direct cost or an indirect cost of the bicycle, a variable cost or a fixed cost, a value-adding cost or a nonvalue-adding cost, and a product cost or a period cost.

	Cost Classification			
	Direct or Indirect	Variable or Fixed	Value-adding or Nonvalue-adding	Product or Period
Example: Bicycle tire	Direct	Variable	Value-adding	Product
1. Depreciation on office computer				
2. Labor to assemble bicycle				
3. Labor to inspect bicycle				
4. President's salary				
5. Lubricant for wheels				

LO 3 Unit Cost Determination

E 3. The Tesla Winery is one of the finest and oldest wineries in the country. One of its most famous products is a red table wine called Olen Millot. The wine is made from Olen Millot grapes grown in the Hudson River Valley. Recently, management has become concerned about the increasing cost of making Olen Millot and needs to determine if the current \$10 per bottle selling price is adequate. The winery wants to achieve a 25 percent gross profit on the sale of each bottle of wine. The information at the top of the next page is given to you for analysis.

- Compute the unit cost per bottle for materials, labor, and manufacturing overhead.
- What would you advise management regarding the price per bottle of Olen Millot wine? Defend your answer.
- Compute the prime costs per unit and the conversion costs per unit.

Batch size	10,550 bottles
Costs	
Direct Materials	
Olen Millot grapes	\$22,155
Chancellor grapes	9,495
Bottles	5,275
Total direct materials costs	\$36,925
Direct Labor	
Pickers/loaders	2,110
Crusher	422
Processors	8,440
Bottler	1,688
Storage and racking	11,605
Total direct labor costs	\$24,265
Manufacturing overhead	
Depreciation, equipment	2,743
Depreciation, building	5,275
Utilities	1,055
Indirect labor	6,330
Supervision	7,385
Supplies	3,165
Storage fixtures	2,532
Chemicals	4,220
Repairs	1,477
Miscellaneous	633
Total manufacturing overhead costs	\$34,815
Total production costs	\$96,005

- E 4.** Lisette Company manufactures music boxes. Seventy percent of its products are standard items produced in long production runs. The other 30 percent are special orders with specific requests for tunes. The latter cost from three to six times as much as the standard product because they require additional materials and labor.

Rena Paul, the controller, recently received a complaint memorandum from Simon Ingol, the production supervisor, about the new network of source documents that was added to the existing cost accounting system. The new documents include a purchase request, a purchase order, a receiving report, and a materials request. Ingol claims that the forms create extra busywork and interrupt the normal flow of production.

Prepare a written memorandum from Rena Paul to Simon Ingol that fully explains the purpose of each type of document.

- E 5.** For each of the following activities, identify the inventory account (Materials Inventory, Work in Process Inventory, Finished Goods Inventory), if any, that is affected. If an inventory account is affected, tell whether the account balance will increase or decrease. *Example:* Moved completed units to finished goods inventory. *Answer:* Increase Finished Goods Inventory, decrease Work in Process Inventory. If no inventory account is affected, use "None of these" as your answer.

- Moved materials requested by production
- Sold units of product to customer
- Purchased and received direct materials for production
- Used direct labor and factory overhead in the production process
- Received payment from customer
- Purchased office supplies and paid cash
- Paid monthly office rent

- E 6.** The following information about the manufacturing costs incurred by the Banty Company for the month ended August 31, 20x3, is available: Purchases of direct materials during August totaled \$139,000; direct labor was 3,400 hours at \$8.75 per hour.

LO 4 Documentation

LO 4 Cost Flows and Inventory Accounts

LO 5 Statement of Cost of Goods Manufactured

The following manufacturing overhead costs were incurred: utilities, \$5,870; supervision, \$16,600; indirect materials, \$6,750; depreciation, \$6,200; insurance, \$1,830; and miscellaneous, \$1,100.

Inventory accounts on July 31 were as follows: Materials Inventory, \$48,600; Work in Process Inventory, \$54,250; and Finished Goods Inventory, \$38,500. Inventory accounts on August 31 were as follows: Materials Inventory, \$50,100; Work in Process Inventory, \$48,400; and Finished Goods Inventory, \$37,450.

From the information given, prepare a statement of cost of goods manufactured.

LO 6 Computation of

LO 7 Predetermined Overhead Rate

- E 7.** The overhead costs used by Kulata Industries, Inc., to compute its predetermined overhead rate for 20x1 are listed below.

Indirect materials and supplies	\$ 79,200
Repairs and maintenance	14,900
Outside service contracts	17,300
Indirect labor	79,100
Factory supervision	42,900
Depreciation, machinery	85,000
Factory insurance	8,200
Property taxes	6,500
Heat, light, and power	7,700
Miscellaneous manufacturing overhead	5,760
	<u>\$346,560</u>

The allocation base for 20x1 was 45,600 total machine hours. In 20x2, all overhead costs except depreciation, property taxes, and miscellaneous manufacturing overhead are expected to increase by 10 percent. Depreciation should increase by 12 percent, and property taxes and miscellaneous manufacturing overhead are expected to increase by 20 percent. Plant capacity in terms of machine hours used will increase by 4,400 hours in 20x2.

1. Compute the 20x1 predetermined overhead rate. (Carry your answer to three decimal places.)
2. Compute the predetermined overhead rate for 20x2. (Carry your answer to three decimal places.)

LO 6 Computation and

LO 7 Application of Overhead Rate

- E 8.** Lai Compumatics specializes in the analysis and reporting of complex inventory costing projects. Materials costs are minimal, consisting entirely of operating supplies (computer diskettes, inventory sheets, and other recording tools). Labor is the highest single expense item, totaling \$693,000 for 75,000 hours of work in 20x4. Manufacturing overhead costs for 20x4 were \$916,000 and were applied to specific jobs on the basis of labor hours worked. In 20x5 the company anticipates a 25 percent increase in manufacturing overhead costs. Labor costs will increase by \$130,000, and the number of hours worked is expected to increase 20 percent.

1. Determine the total amount of manufacturing overhead anticipated by the company in 20x5.
2. Compute the predetermined manufacturing overhead rate for 20x5. (Round your answer to the nearest penny.)
3. During April 20x5, 11,980 labor hours were worked. Calculate the manufacturing overhead amount assigned to April production.

LO 6 Disposition of Overapplied

LO 7 Overhead

- E 9.** At the end of 20x5, Lai Compumatics had compiled a total of 89,920 labor hours worked. The actual manufacturing overhead incurred was \$1,143,400.

1. Using the predetermined overhead rate computed in E 8, determine the total amount of manufacturing overhead applied to operations during 20x5.
2. Compute the amount of overapplied overhead for the year.
3. Will the Cost of Goods Sold account be increased or decreased to correct the over-application of manufacturing overhead?

LO 7 Activities and Activity-Based
LO 8 Costing

- E 10.** Ganza Enterprises produces antennas for telecommunications equipment. One of the most important parts of the company's new just-in-time production process is quality control. Initially, a traditional allocation method was used to assign quality control costs to products. All costs of the Quality Control Department were included in the plant's overhead cost pool and allocated to products based on direct labor dollars. Recently, the firm implemented an activity-based costing system. The activities, cost drivers, and rates for the quality control function are summarized below, along with cost allocation information from the traditional system. Also shown is information related to one order of the Lavoro model antenna, Order HL14. Compute the quality control cost that would be assigned to the Lavoro model order under both the traditional method and the activity-based costing method.

Traditional costing method:

Quality control costs were assigned at a rate of 12 percent of direct labor dollars. Order HL14 was charged with \$9,350 of direct labor costs.

Activity-based costing method:

Quality Control Function

Activity	Cost Driver	Activity Cost Rate	Order HL14 Activity Usage
Incoming materials inspection	Types of materials used	\$17.50 per type of material	17 types of materials
In-process inspection	Number of products	\$.06 per product	2,400 products
Tool and gauge control	Number of processes per cell	\$26.50 per process	11 processes
Product certification	Per order	\$94.00 per order	1 order

LO 9 Unit Costs in a Service Business

- E 11.** Wade Robbin provides custom farming services to owners of five-acre alfalfa fields. In July, he earned \$2,400 by cutting, turning, and baling 3,000 bales of alfalfa. In the same month, he incurred the following costs: gas, \$150; tractor maintenance, \$115; and labor, \$600. His annual tractor depreciation was \$1,500. What was Robbin's cost per bale? What was his revenue per bale? Should he increase the amount he charges the owners for his custom farming services?

PROBLEMS

LO 3 Computation of Unit Cost



- P 1.** Holland Industries, Inc., manufactures videodiscs for several of the leading recording studios in the United States and Europe. Department 60 is responsible for the electronic circuitry within each disc. Department 61 applies the plastic-like surface to the discs and packages them for shipment. A recent order for 4,000 discs from the Gael Company was produced during July. For this job, the departments incurred the costs shown below to complete and ship the goods in July.

	Department	
	60	61
Direct materials used	\$29,440	\$3,920
Direct labor	6,800	2,560
Manufacturing overhead	7,360	4,800

REQUIRED

1. Compute the unit cost for each of the two departments.
2. Compute the total unit cost for the Gael Company order.
3. The selling price for this order was \$14 per unit. Was the selling price adequate? List the assumptions and/or computations upon which you based your answer. What suggestions would you make to Holland Industries' management concerning the pricing of future orders?
4. Compute the prime costs and conversion costs per unit for each department.

LO 5 Statement of Cost of Goods Manufactured

- P 2.** Plano Vineyards operates a large winery in Texas that produces a full line of varietal wines. The company, whose fiscal year begins on November 1, has just completed a record-breaking year. The vineyard's inventory account balances on October 31, 20x1,

were: Materials Inventory, \$1,803,800; Work in Process Inventory, \$2,764,500; and Finished Goods Inventory, \$1,883,200. October 31, 20x0, inventory account balances were: Materials Inventory, \$2,156,200; Work in Process Inventory, \$3,371,000; and Finished Goods Inventory, \$1,596,400.

During the 20x0–20x1 fiscal year, direct materials were purchased for \$6,750,000. Direct labor hours incurred totaled 142,500 at an average labor rate of \$8.20 per hour. The following manufacturing overhead costs were incurred during the year: depreciation, plant and equipment, \$685,600; indirect labor, \$207,300; property tax, plant and equipment, \$94,200; plant maintenance, \$83,700; small tools, \$42,400; utilities, \$96,500; and employee benefits, \$76,100.

REQUIRED

Prepare a statement of cost of goods manufactured for the fiscal year ended October 31, 20x1.

LO 5 Statement of Cost of Goods Manufactured and Cost of Goods Sold

**P 3.**

Guado Corp. makes irrigation sprinkler systems for farmers in semi-arid and desert climates. Rammohan Sarthy, the new controller for the organization, can find only partial information for the past year, which is presented below.

	Lillor Division	Berne Division	Lubbock Division	Secco Division
Direct materials used	\$3	\$ 7	\$ g	\$ 8
Total manufacturing costs	6	d	h	14
Manufacturing overhead	1	3	2	j
Direct labor	a	6	4	4
Ending Work in Process Inventory	b	3	2	5
Cost of goods manufactured	7	20	12	k
Beginning Work in Process Inventory	2	e	3	1
Ending Finished Goods Inventory	2	6	i	9
Beginning Finished Goods Inventory	3	f	5	7
Cost of goods sold	c	18	13	9

REQUIRED

Using the information given, compute the unknown values. List the accounts in the proper order and show subtotals and totals as appropriate.

LO 6 Allocation of Manufacturing Overhead

**P 4.**

Dai Products, Inc., uses a predetermined manufacturing overhead rate in its production, assembly, and testing departments. One rate is used for the entire company; it is based on machine hours. The current rate was determined by analyzing data from the previous two years and projecting figures for the current year, adjusted for expected changes. Mr. Yulin is about to compute the rate to be used in 20x3 using the following data.

	20x1	20x2
Machine hours	38,000	41,800
Manufacturing overhead costs:		
Indirect materials	\$ 44,500	\$ 57,850
Indirect labor	21,200	25,440
Supervision	37,800	41,580
Utilities	9,400	11,280
Labor-related costs	8,200	9,020
Depreciation, factory	9,800	10,780
Depreciation, machinery	22,700	27,240
Property taxes	2,400	2,880
Insurance	1,600	1,920
Miscellaneous manufacturing overhead	4,400	4,840
Total manufacturing overhead	\$162,000	\$192,830

In 20x3, indirect materials are expected to increase by 30 percent over the previous year. Indirect labor, utilities, machinery depreciation, property taxes, and insurance are expected to increase by 20 percent. All other expenses are expected to increase by 10 percent. Machine hours are estimated to be 45,980 for 20x3.

REQUIRED

1. Compute the projected costs and the predetermined manufacturing overhead rate for year 20x3 using the information about expected cost increases. (Round your answer to three decimal places.)
2. During 20x3, Dai Products, Inc., produced the following jobs using the machine hours shown.

Job No.	Machine Hours	Job No.	Machine Hours
H-142	7,840	H-201	10,680
H-164	5,260	H-218	12,310
H-175	8,100	H-304	2,460

Determine the amount of manufacturing overhead applied to each job in 20x3. What was the total manufacturing overhead applied during the year? (Round answers to the nearest dollar.)

3. Actual manufacturing overhead for 20x3 was \$234,485. Was overhead underapplied or overapplied in 20x3? By how much? Should the Cost of Goods Sold account be increased or decreased to reflect actual overhead costs?

LO 8 Activities and Activity-Based Costing


- P 5.** Pitrof Products, Inc., produces a line of fax machines for wholesale distributors in the Pacific Northwest. Altun Company ordered 150 Model 14 fax machines, and Pitrof has just completed packaging the order. Before the Altun order is shipped, the controller has asked for a unit cost analysis comparing the amounts determined under the company's former traditional costing system with amounts computed under the new activity-based costing system. Raw materials, purchased parts, and production labor costs for the Altun order are as follows:

Cost of direct materials	\$17,450.00	Production direct labor hours	140
Cost of purchased parts	\$14,800.00	Average direct labor pay rate	\$16.50

Other operating costs are as follows:

Traditional costing data using a single, plantwide overhead rate:

Manufacturing overhead costs were assigned at a rate of 240 percent of direct labor dollars.

Activity-based costing data:

Activity	Cost Driver	Activity Cost Rate	Activity Usage for Altun Order
Engineering systems design	Engineering hours	\$28.00 per engineering hour	18 engineering hours
Setup	Number of setups	\$42.00 per setup	8 setups
Parts production	Machine hours	\$37.50 per machine hour	84 machine hours
Assembly	Assembly hours	\$44.00 per assembly hour	36 assembly hours
Packaging	Packaging hours	\$28.50 per packaging hour	28 packaging hours

Building-occupancy overhead costs are assigned at a rate of \$10.40 per parts production machine hour.

REQUIRED

1. Using the traditional costing approach with a single, plantwide overhead rate, compute the total cost of the Altun order.
2. Using the activity-based costing approach, compute the total cost of the Altun order.
3. What difference in the amount of cost assigned to the Altun order resulted from the shift to activity-based costing? Does the use of activity-based costing guarantee cost reduction for every product?

ALTERNATE PROBLEMS

LO 6 Allocation of Manufacturing Overhead

- P 6.** Features Cosmetics Company applies manufacturing overhead costs on the basis of machine hours. The current predetermined overhead rate is computed by using data from the two prior years, in this case 20x0 and 20x1, adjusted to reflect expectations



for the current year, 20x2. The controller prepared the overhead rate analysis for 20x2 using the information below.

	20x0	20x1
Machine hours	47,800	57,360
Manufacturing overhead costs:		
Indirect labor	\$ 18,100	\$ 23,530
Employee benefits	22,000	28,600
Manufacturing supervision	16,800	18,480
Utilities	10,350	14,490
Factory insurance	6,500	7,800
Janitorial services	11,000	12,100
Depreciation, factory and machinery	17,750	21,300
Miscellaneous manufacturing overhead	5,750	7,475
Total manufacturing overhead	<u>\$108,250</u>	<u>\$133,775</u>

In 20x2, utilities are expected to increase by 40 percent over the previous year; indirect labor, employee benefits, and miscellaneous manufacturing overhead are expected to increase by 30 percent; insurance and depreciation are expected to increase by 20 percent; and supervision and janitorial services are expected to increase by 10 percent. Machine hours are expected to total 68,832.

REQUIRED

1. Compute the projected costs and the predetermined overhead rate for 20x2 using the information about expected cost increases. (Carry your answer to three decimal places.)
2. Assume that the company actually surpassed its sales and operating expectations in 20x2. Jobs completed during the year and the related machine hours used were as follows:

Job No.	Machine Hours
2214	12,300
2215	14,200
2216	9,800
2217	13,600
2218	11,300
2219	8,100

Total machine hours were 69,300. Determine the amount of manufacturing overhead to be applied to each job and to total production during 20x2. (Round answers to whole dollars.)

3. Assume that \$165,845 of manufacturing overhead was incurred during the year. Was overhead underapplied or overapplied in 20x2? By how much? Should the Cost of Goods Sold account be increased or decreased to reflect actual manufacturing overhead costs?

LO 8 Activities and Activity-Based Costing



P 7.

Sable Computer Company, which has been in operation for ten years, produces a line of minicomputers. Winkowsky, Ltd., placed an order for eighty minicomputers, and the order has just been completed. Sable recently shifted to an activity-based system of cost assignment. Lucy Sanchez, the controller, is interested in finding out the impact that the ABC system had on the Winkowsky order. Raw materials, purchased parts, and production labor costs for the Winkowsky order are as follows:

Cost of direct materials	\$36,750.00	Production direct labor hours	220
Cost of purchased parts	\$21,300.00	Average direct labor pay rate	\$15.25

Other operating costs are as follows:

Traditional costing data using a single, plantwide overhead rate:

Manufacturing overhead costs were assigned at a rate of 270 percent of direct labor dollars.

Activity-based costing data:

Activity	Cost Driver	Activity Cost Rate	Activity Usage for Winkowsky Order
Electrical engineering design	Engineering hours	\$19.50 per engineering hour	32 engineering hours
Setup	Number of setups	\$29.40 per setup	11 setups
Parts production	Machine hours	\$26.30 per machine hour	134 machine hours
Product testing	Product testing hours	\$32.80 per product testing hour	52 product testing hours
Packaging	Packaging hours	\$17.50 per packaging hour	22 packaging hours

Building-occupancy overhead costs are allocated at a rate of \$9.80 per parts production machine hour.

REQUIRED

- Using the traditional costing method, compute the total cost of the Winkowsky order.
- Using the activity-based costing method, compute the total cost of the Winkowsky order.
- What difference in the amount of cost assigned to the Winkowsky order resulted from the shift to activity-based costing? Does the use of activity-based costing guarantee cost reduction for every product?

P 8.

LO 6 Allocation of Manufacturing
LO 7 Overhead: Traditional and
LO 8 Activity-Based Costing
 Methods



Sea Scout, Inc., manufactures underwater vehicles. Oil companies use the Rigger II to examine offshore oil rigs, and marine biology research foundations use the BioScout for research studies along coastlines. The company's San Diego factory is semiautomated and requires some direct labor. Woo So, the controller, used normal costing to calculate the product unit cost for both product lines. She calculated a traditional predetermined overhead rate of \$13.75 per direct labor hour. A summary of the product unit cost and other relevant information under normal costing follow.

	Rigger II	BioScout
Product costs per unit:		
Direct materials	\$ 10,000.00	\$12,000.00
Direct labor	1,450.00	1,600.00
Manufacturing overhead	412.50*	550.00**
Product unit cost	<u>\$ 11,862.50</u>	<u>\$14,150.00</u>
Units of production	400	100
Estimated direct labor hours	12,000	4,000
Estimated manufacturing overhead costs	\$220,000.00	

* Applied to Rigger II = \$13.75 per direct labor hour × 30 direct labor hours per unit

** Applied to BioScout = \$13.75 per direct labor hour × 40 direct labor hours per unit

Woo So believes that the product unit cost for the BioScout line is too low. After carefully watching the production process, she believes that the BioScout requires much more attention than the Rigger II, since suppliers perform many subassemblies for the Rigger II, and the intricate design of the BioScout requires more activities to complete the production process. Woo So created four overhead activity pools, grouped the estimated manufacturing overhead costs into related cost pools, selected a cost driver for each pool, and estimated the cost driver levels for each product line, as shown in the following summary.

Activity Pool	Estimated Activity Pool Amount
Setup	\$ 70,000
Inspection	20,000
Engineering	50,000
Assembly	80,000
Total	<u>\$220,000</u>

Cost Driver	Rigger II Cost Driver Level	BioScout Cost Driver Level	Total Cost Driver Level
Number of setups	250	450	700
Number of inspections	150	350	500
Engineering hours	600	1,400	2,000
Machine hours	5,000	5,000	10,000

REQUIRED

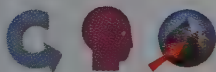
- Using the activity-based costing approach:
 - Calculate the activity cost rate for each activity pool.
 - Compute the overhead costs applied to each product line by activity pool and in total.
 - Calculate the product unit cost for each product line.
- What differences in the costs assigned to the two product lines resulted from the shift to activity-based costing?

EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

- LO 1** Comparison of Costs for
LO 2 Different Types of
Businesses



SD 1. *H & R Block* is a service company that prepares tax returns; *Borders* is a retail company that sells books and CDs; *Harley-Davidson* is a manufacturing company that makes motorcycles. Show that you understand the differences among these companies by giving for each an example of a direct and indirect cost, a variable and fixed cost, a value-adding and nonvalue-adding cost, and a product and period cost. Discuss the differences in the types of businesses with respect to cost classifications.

- LO 6** Comparison of Approaches
LO 7 to Predetermined Overhead
LO 8 Rates



SD 2. Both *Brown Company* and *Santo Corporation* use predetermined overhead rates for product costing, inventory valuation, and sales quotations. The two businesses are about the same size, and they compete in the corrugated box industry. Brown Company's management believes that because the predetermined overhead rate is an estimated measure, the controller's department should spend little effort in developing it. The company computes the rate once a year based on a trend analysis of the previous year's costs. No one monitors its accuracy during the year.

Santo Corporation takes a much more sophisticated approach. One person in the controller's office is responsible for developing predetermined overhead rates on a monthly basis. All cost estimates are checked carefully to make sure they are realistic. Accuracy checks are done routinely during each monthly closing analysis, and forecasts of changes in business activity are taken into account.

Assume you are a consultant who has been hired by the *Corwin Corporation*, an East Coast manufacturer of corrugated boxes. Lisa Nyman wants you to recommend the best approach for developing overhead rates. Based on your knowledge of the practices described above, write a memo to Lisa Nyman that will answer the following questions.

- What are the advantages and disadvantages of each company's approach to developing predetermined overhead rates?
- Which company has taken the more cost-effective approach to developing predetermined overhead rates? Defend your answer.



Communication



Critical Thinking



Ethics

Group
ActivityHot Links
to Real Companies

International



Internet



Memo



Spreadsheet

3. Is an accurate overhead rate most important for product costing, inventory valuation, or sales quotations? Why?
4. What is activity-based costing (ABC)? Would it be better than the two approaches discussed above? Explain.

Ethical Dilemma

SD 3.

LO 9 Preventing Pollution and the Costs of Waste Disposal



Pleasanton Power Plant currently provides power to a metropolitan area of 4 million people. Tamika Simms, the controller for the plant, just returned from a conference about the Environmental Protection Agency's regulations concerning pollution prevention. She met with Jake Gates, the president of the company, to discuss the impact of the EPA's regulations on the plant.

"Jake, I'm really concerned. We haven't been monitoring the disposal of the radioactive material we send to the Digger Disposal Plant. If Digger is disposing of our waste material improperly, we could be sued," said Simms. "We also haven't been recording the costs of the waste as part of our product cost. Ignoring those costs will have a negative impact on our decision about the next rate hike."

"Tamika, don't worry. I don't think we need to concern ourselves with the waste we send to Digger. We pay them to dispose of it. They take it off of our hands, and it's their responsibility to manage its disposal. As for the cost of waste disposal, I think we would have a hard time justifying a rate increase based on a requirement to record the full cost of waste as a cost of producing power. Let's just forget about waste and its disposal as a component of our power cost. We can get our rate increase without mentioning waste disposal," replied Gates.

What responsibility does Pleasanton Power Plant have to monitor the condition of the waste at the Digger Disposal Plant? Should Simms take Gates's advice to ignore waste disposal costs in calculating the cost of power? Be prepared to discuss your response.

Research Activity

SD 4.

LO 2 Cost Classification



Make a trip to a local fast-food restaurant. Observe all aspects of the operation and take notes on the entire process. Describe the procedures used to take, process, and fill an order and get the food to the customer. Based on your observations, make a list of the costs incurred by the owner. Then make a table similar to Table 2 in the text, in which you classify the costs you have identified by their traceability (direct, indirect, or neither), cost behavior (variable or fixed), value attribute (value-adding or nonvalue-adding), and financial reporting (product or period). Bring your notes and your table to class and be prepared to discuss your findings.



Group Activity: Divide the class into groups and ask them to discuss this SD. Then ask a person from each group to summarize his or her group's discussion.

Decision-Making Practice

SD 5.

LO 9 Unit Costs for a Service Business



Keaton Municipal Hospital relies heavily on cost data to keep its pricing structures in line with those of competitors. The hospital provides a wide range of services, including nursing care in intensive care units, intermediate care units, the neonatal (newborn) nursery, and nursing administration. Ella Walton, the hospital's controller, is concerned about the profits being generated from the 30-bed intensive care unit (ICU), so she is reviewing current billing procedures. The focus of Walton's analysis is Keaton's billing per patient day. The billing per patient day equals the cost of a patient day in the ICU plus a markup of an additional 40 percent of cost to cover other operating costs and to generate a profit. ICU patient costs include the following:

Doctors' care	2 hours per day @ \$360 per hour (actual)
Special nursing care	4 hours per day @ \$85 per hour (actual)
Regular nursing care	24 hours per day @ \$28 per hour (average)
Medications	\$237 per day (average)
Medical supplies	\$134 per day (average)
Room rental	\$350 per day (average)
Food and services	\$140 per day (average)

One other significant cost is equipment, which costs about \$185,000 per room. Walton has determined that the cost per patient day for the equipment is \$179.

Paul Sautter, the hospital director, has asked Walton to review the current billing procedure and compare it to another procedure using industry averages to determine the billing per patient day.

1. Compute the cost per patient per day.
2. Compute the billing per patient day using the hospital's existing markup rate. Round answers to whole dollars.
3. Many hospitals use separate markup rates for each cost when preparing billing statements. Industry averages revealed the following markup rates:

Equipment	30%	Medications	50%
Doctors' care	50	Medical supplies	50
Special nursing care	40	Room rental	30
Regular nursing care	50	Food and services	25

Using those rates, recompute the billing per patient day in the ICU. Round answers to whole dollars.

4. Based on your findings in 2 and 3, which billing procedure would you recommend to the hospital's director? Why? Be prepared to discuss your response.

Rico Manufacturing Company
Statements of Cost of Goods Manufactured
For the Years Ended December 31, 20x1 and 20x0

	20x1	20x0
Direct Materials Used		
Materials Inventory, Beginning	\$ 91,240	\$ 93,560
Direct Materials Purchased (net)	987,640	959,940
Cost of Direct Materials Available for Use	\$1,078,880	\$1,053,500
Less Materials Inventory, Ending	95,020	91,240
Cost of Direct Materials Used	\$ 983,860	\$ 962,260
Direct Labor	571,410	579,720
Manufacturing Overhead		
Indirect Labor	\$ 182,660	\$ 171,980
Power	34,990	32,550
Insurance	22,430	18,530
Supervision	125,330	120,050
Depreciation	75,730	72,720
Other Manufacturing Costs	41,740	36,280
Total Manufacturing Overhead	482,880	452,110
Total Manufacturing Costs	\$2,038,150	\$1,994,090
Add Work in Process Inventory, Beginning	148,875	152,275
Total Cost of Work in Process During the Year	\$2,187,025	\$2,146,365
Less Work in Process Inventory, Ending	146,750	148,875
Cost of Goods Manufactured	<u>\$2,040,275</u>	<u>\$1,997,490</u>

MANAGERIAL REPORTING AND ANALYSIS

Interpreting Management Reports

LO 5 Financial Performance Measures



MRA 1. *Rico Manufacturing Company* makes sheet metal products for heating and air conditioning installations. For the past several years, the income of the company has been declining, and this past year, 20x1, was particularly poor. The company's statements of cost of goods manufactured and income statements for 20x0 and 20x1 are shown at the bottom of the preceding page and below.

You have been asked to comment on why the company's profitability has deteriorated.

1. In preparing your comments on the decline in income, compute the following ratios for each year:
 - a. Ratios of cost of direct materials used to total manufacturing costs, direct labor to total manufacturing costs, and total manufacturing overhead to total manufacturing costs. Round to one decimal place.
 - b. Ratios of sales salaries and commission expense, advertising expense, other selling expenses, administrative expenses, and total selling and administrative expenses to sales. Round to one decimal place.
 - c. Ratios of gross margin to sales and net income to sales. Round to one decimal place.

Rico Manufacturing Company Income Statements For the Years Ended December 31, 20x1 and 20x0

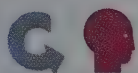
	20x1	20x0
Sales	\$2,942,960	\$3,096,220
Cost of Goods Sold		
Finished Goods Inventory,		
Beginning	\$ 142,640	\$ 184,820
Cost of Goods Manufactured	<u>2,040,275</u>	<u>1,997,490</u>
Total Cost of Finished Goods		
Available for Sale	\$2,182,915	\$2,182,310
Less Finished Goods		
Inventory, Ending	<u>186,630</u>	<u>142,640</u>
Cost of Goods Sold	<u>1,996,285</u>	<u>2,039,670</u>
Gross Margin	\$ 946,675	\$1,056,550
Selling and Administrative Expenses		
Sales Salaries and		
Commission Expense	\$ 394,840	\$ 329,480
Advertising Expense	116,110	194,290
Other Selling Expenses	82,680	72,930
Administrative Expenses	<u>242,600</u>	<u>195,530</u>
Total Selling and Administrative Expenses	<u>836,230</u>	<u>792,230</u>
Income from Operations	\$ 110,445	\$ 264,320
Other Revenues and Expenses		
Interest Expense	<u>54,160</u>	<u>56,815</u>
Income Before Income Taxes	\$ 56,285	\$ 207,505
Less Income Taxes Expense	<u>19,137</u>	<u>87,586</u>
Net Income	<u>\$ 37,148</u>	<u>\$ 119,919</u>

- From your evaluation of the ratios computed in 1, state the probable causes of the decline in net income.
- What other factors or ratios do you believe should be considered in determining the cause of the company's decreased income?

Formulating Management Reports

MRA 2.

LO 9 Management Decision for a Supporting Service Function



As the manager of grounds maintenance for *INNET*, a large insurance company in California, you are responsible for maintaining the grounds surrounding the three buildings, the six entrances to the property, and the recreational facilities, which include a golf course, a soccer field, jogging and bike paths, and tennis, basketball, and volleyball courts. Maintenance activities include gardening (watering, mowing, trimming, sweeping, and removing debris) and upkeep of land improvements (repairing concrete and gravel areas and replacing damaged or worn recreational equipment).

Early in January 20x2, you received a memo from the president requesting information about the cost of operating your department for the last twelve months. She has received a bid from Fantastic Landscapes, Inc., to perform the gardening activities you now perform. You are to prepare a cost report that will help the president in deciding whether to continue gardening activities within the company or to outsource the work to another company.

REQUIRED

- Before preparing your report, answer the following questions.
 - What kinds of information do you need about your department?
 - Why is this information relevant?
 - Where would you go to obtain this information (sources)?
 - When would you want to obtain this information?
- Prepare a draft of the cost report that would best communicate the costs of your department. Show only headings and line items. How would you change your report if the president asked you to reduce the costs of operating your department?
- One of your department's costs is Maintenance Expense, Garden Equipment.
 - Is it a direct or indirect cost for the Grounds Maintenance Department?
 - Is it a product or a period cost?
 - Is it a variable or a fixed cost?
 - Does the activity add value to the provision of insurance services?
 - Is it a budgeted or an actual cost in your report?

International Company

MRA 3.

LO 5 Management Information Needs



The *Muntok Pharmaceuticals Corporation* manufactures the majority of its three pharmaceutical products in Indonesia. Inventory information for April 20x1 was as follows:

Account	April 30	March 31
Materials Inventory	\$228,100	\$258,400
Work in Process Inventory	127,200	138,800
Finished Goods Inventory	114,100	111,700

Purchases of direct materials for April were \$612,600, which included natural materials, basic organic compounds, catalysts, and suspension agents. Direct labor costs were \$160,000, and actual manufacturing overhead costs were \$303,500. Sales for the company's three pharmaceutical products for April were \$2,188,400. General and administrative expenses were \$362,000.

REQUIRED

- Prepare a statement of cost of goods manufactured and an income statement for the month ended April 30.
- Why don't the total manufacturing costs equal the cost of goods manufactured?
- What additional information would you need to determine the profitability of each pharmaceutical product line?
- Tell whether each of the following is a product cost or a period cost:
 - Import duties for suspension agent materials
 - Shipping expenses to deliver manufactured products to the United States

- c. Rent on manufacturing facilities in Jakarta
- d. Salary of the American production line manager working at the Indonesian manufacturing facilities
- e. Training costs for an Indonesian accountant

Excel Spreadsheet Analysis

MRA 4.

Refer to assignment P 8 in this chapter. Assume that Woo So, the controller of Sea Scout, Inc., has received some additional information from the production manager, Leif Sonder. Sonder reported that robotic equipment has been installed on the factory floor to increase productivity. As a result, direct labor hours per unit will decrease by 20 percent. Depreciation and other machine costs for the robots will increase total manufacturing overhead from \$220,000 to \$320,000 for the year, which will increase the assembly activity cost pool from \$80,000 to \$180,000. The cost driver level for the assembly cost pool will change from 5,000 machine hours to 2,000 machine hours for the Rigger II and from 5,000 machine hours to 8,000 machine hours for the BioScout. The cost driver levels and cost pool amounts for setup, inspection, and engineering activities will remain the same.

- LO 6** Application of Manufacturing
LO 7 Overhead: Traditional and
LO 8 Activity-Based Costing
Approaches



REQUIRED

1. Using the traditional method of applying overhead:
 - a. Calculate the predetermined overhead rate.
 - b. Compute the amount of the total manufacturing overhead costs applied to each product line.
 - c. Calculate the product unit cost for each product line.
2. Using the activity-based costing method:
 - a. Calculate the manufacturing overhead activity cost rate for each activity pool.
 - b. Compute the manufacturing overhead costs applied to each product line by activity pool and in total.
 - c. Calculate the product unit cost for each product line.
3. Complete the following table and discuss the differences in the costs assigned to the two product lines resulting from the additional information in this assignment.

Product unit cost	Rigger II	BioScout
Traditional		
Activity-based costing	_____	_____
Difference: decrease (increase)	=====	=====

Internet Case

MRA 5.

Through the Needles Accounting Resource Center web site at <http://college.hmco.com>, assess the web site for either Gateway Inc. or Dell Computer Corporation. Both companies manufacture and sell computers over the telephone or the Internet. To manufacture their products, both companies buy component parts from other companies and assemble the final product. Become familiar with the product line sold by the company you have chosen. For one of those products, such as a desktop or laptop computer, give examples of a direct and an indirect cost, a variable and a fixed cost, a value-adding and a nonvalue-adding cost, and a product and a period cost. Also, give examples of the three elements of product cost: direct materials, direct labor, and manufacturing overhead.

- LO 2** Identification of Costs for a
LO 3 Manufacturing Company



ENDNOTES

1. Bruce Upbin, "Sharpening the Claws," *Forbes*, July 26, 1999.
2. www.ups.com/about/inits.html.
3. Neal R. Pemberton, Logan Arumugam, and Nabil Hassan, "From Obstacles to Opportunities," *Management Accounting*, Institute of Management Accountants, March 1996.
4. Kathy Williams and James Hart, "Walker: Deploying a Mainframe Solution," *Management Accounting*, Institute of Management Accountants, June 1997.

21

Costing Systems: Job Order and Process Costing

LEARNING OBJECTIVES

- 1** Discuss the role information about costs plays in the management cycle and explain why product unit cost is important.
- 2** Distinguish between the different types of product costing systems and identify the information each provides.
- 3** Explain the cost flow in a job order costing system for a manufacturing company.
- 4** Prepare a job order cost card and compute a job order's product unit cost.
- 5** Explain the product flow and the cost flow in a process costing system.
- 6** Prepare a process cost report.
- 7** Evaluate operating performance using information about product cost.



DECISION POINT: A MANAGER'S FOCUS



John H. Daniel Company

Whatever a man's size, John H. Daniel Company has a suit to fit him. In addition to a division that produces large quantities of quality suits for retailers, the company has a division that manufactures made-to-order suits, pants, and sport coats for individuals based on their personal measurements. The made-to-order process begins when one of over 300 custom tailors from around the United States visits an individual customer at his home or office to show him the latest fabrics and styles for suits. When the customer has made his selections, the tailor takes various measurements to guarantee the fit. The tailor then transmits the customer's measurements to John H. Daniel Company's manufacturing plant in Knoxville, Tennessee, along with the customer's choices of fabric, suit model, leg finish, and pocket type. At the factory, state-of-the-art technology is used to cut the fabric to the order's specifications. A skilled, specialized team sews the pieces together and presses the finished suit. The suit is shipped to the custom tailor, who delivers it for final fitting and approval at a time convenient for the customer. The whole process generally takes less than five weeks to complete.

Is the product costing system used when making ready-made suits appropriate for the production of made-to-order suits? Why would John H. Daniel Company consider implementing a different product costing system for each division? What performance measures would be most useful in evaluating the results of each division? The nature of production usually determines the product costing system that should be used. The custom suit approach involves producing unique, made-to-order suits according to the specific requirements given in an individual's order. John H. Daniel Company's other division produces a continuous flow of predetermined styles of suits. Because the production processes differ, each division will probably need its own costing system to determine the cost of a suit.

How the cost of a suit is computed will differ because the approach to manufacturing custom orders differs from the approach to manufacturing large quantities of similar products. When a product is custom-made, it is possible to collect the costs of each order. When a product is mass-produced, however, the costs of a specific unit cannot be collected

because there is a continuous flow of similar products. Instead, costs are collected by process, department, work cell, or activity.

Performance measures will also differ for John H. Daniel Company's two types of suit businesses. For the custom suit business, management can measure the profitability of each order by comparing the order's cost and price. For the mass-produced suit business, management will measure performance by comparing the budgeted and actual costs for a process, department, work cell, or activity.

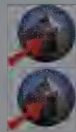
Product Cost Information and the Management Cycle

OBJECTIVE

1 Discuss the role information about costs plays in the management cycle and explain why product unit cost is important

Managers depend on relevant and reliable information about costs in managing their organizations. The role of the management accountant is to develop a management information system that provides managers with the cost information they need. Although companies vary in their approaches to gathering, analyzing, and reporting information about costs, managers share the same basic concerns as they move through the management cycle. Figure 1 summarizes the management cycle and the concerns managers address with relevant and timely information about costs.

Planning

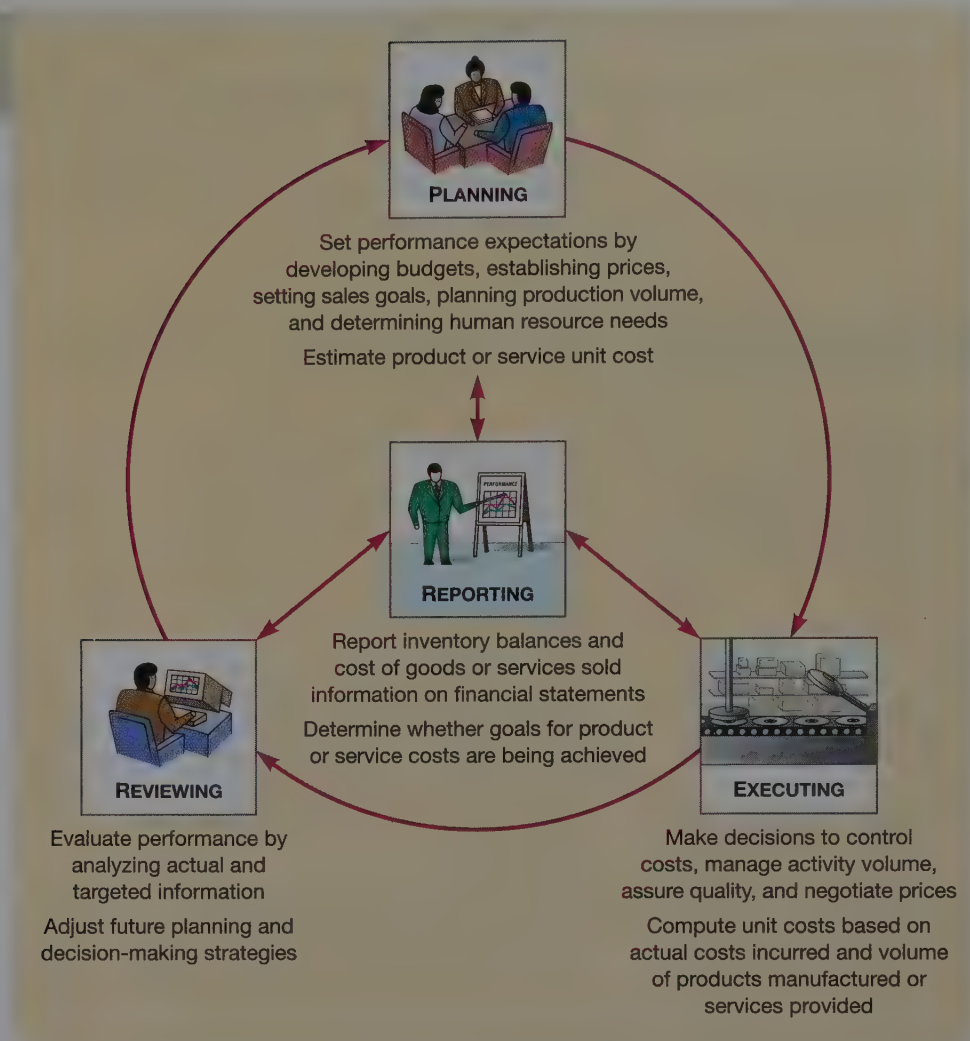


During the planning stage, managers use information about costs to set performance expectations and estimate unit costs. In manufacturing companies, such as Toyota, Harley-Davidson, and Levi Strauss and Co., managers use information about costs to develop budgets, establish product prices, and plan production volumes. In service organizations, such as Century 21, H & R Block, and Orkin Exterminating Company, Inc., managers use cost information to develop budgets, establish prices, set sales goals, and determine human resource needs. Notice that during the planning stage, knowledge of unit costs helps both manufacturing and service company managers set reasonable selling prices and determine how much the products or services should cost to deliver.

Executing

During the executing stage, managers make decisions about controlling costs, managing the company's activity volume, assuring quality, and negotiating prices. They use timely cost and volume information and actual unit costs to support their decision-making. In manufacturing companies, managers use information about costs to decide whether to drop a product line, add a production shift, outsource the manufacture of a subassembly to another manufacturer, bid on a special order, or negotiate a selling price. In service organizations, managers use cost information to make decisions about bidding on future service proposals, dropping a current service, outsourcing a task to an independent contractor, adding staff, or negotiating a price. All of these decisions can have far-reaching effects, including possible changes in unit cost or quality.

Figure 1
Uses of Information About Costs in
the Management Cycle



Reviewing

Managers watch for changes in cost or quality during the reviewing stage. They compare actual and targeted total costs and unit costs. They also monitor relevant price and volume information. Managers analyze this information to evaluate their performance and adjust future planning and decision-making strategies. For example, if a product's quality is suffering, managers can study the design, material purchasing, and manufacturing processes to determine the source of the problem. Then they can make changes that will assure the product's quality. In a service business, if operating costs have risen too high, managers can break down the unit cost of service into its many components. Then they can analyze where costs can be cut or how the service can be performed more efficiently.

Reporting

Finally, during the reporting stage of the management cycle, financial statements and internal performance evaluation reports are prepared. In manufacturing companies, management accountants use product unit costs to determine both inventory balances for the organization's balance sheet and the cost of goods sold for its income statement.

In service organizations, management accountants use unit cost of service information to determine cost of sales for the income statement. In both manufacturing and service organizations, managers analyze internal reports that compare actual unit costs and targeted costs. Those internal reports also contain actual and targeted values for other performance measures that the organization has chosen for goals. The comparisons of costs and nonfinancial measures help managers determine whether goals for products or services are being achieved.

Job Order Versus Process Costing

OBJECTIVE

2 Distinguish between the different types of product costing systems and identify the information each provides

If an organization is to succeed, its managers must sell its products or services at prices that exceed the costs of creating and delivering those products or services plus provide a reasonable profit. Thus, managers need extensive information about such product-related costs as setup, production, and distribution. To meet managers' needs for cost information, it is necessary to develop a highly reliable product costing system that is specifically designed to record and report the organization's operations.

A **product costing system** is a set of procedures used to account for an organization's product costs and provide timely and accurate unit cost information for pricing, cost planning and control, inventory valuation, and financial statement preparation. The product costing system enables managers to track costs throughout the management cycle. It provides a structure for recording the revenue earned from sales plus the costs incurred for direct materials, direct labor, and manufacturing overhead.

Two basic product costing systems have been developed: job order costing and process costing. A **job order costing system** is a product costing system used by both service organizations and manufacturing companies that make large, unique, or special-order products, such as customized publications, specially built cabinets, made-to-order draperies, or, as in our Decision Point, custom suits. Under such a system, the costs of direct materials, direct labor, and manufacturing overhead are traced to a specific job order or batch of products. A **job order** is a customer order for a specific number of specially designed, made-to-order products. Job order costing measures the cost of each complete unit. It uses one Work in Process Inventory account to summarize the costs of all jobs. This account is supported by job order cost cards or a subsidiary ledger of accounts for each job.

A **process costing system** is a product costing system used by companies that produce large amounts of similar products or liquids, or that have a continuous production flow. Makers of paint, soft drinks, bricks, milk, or paper would use a process costing system, as would the John H. Daniel Company's retail suit division. Under such a system, the costs of direct materials, direct labor, and manufacturing overhead are first traced to processes, departments, or work cells and then assigned to the products manufactured by those processes, departments, or work cells. A process costing system uses several Work in Process Inventory accounts, one for each process, department, or work cell. Table 1 summarizes the characteristics of job order and process costing systems.

In reality, few actual production processes perfectly match either a job order costing system or a process costing system. Thus, the typical product costing system combines parts of both job order costing and process costing to create a hybrid system designed specifically for an organization's particular production process. For example, an automobile maker may use process costing to track the costs of manufacturing a basic car and then use job order costing to track the costs of customized features, such as a convertible or hardtop, or an automatic transmis-



Table 1. Characteristics of Job Order and Process Costing Systems

Job Order Costing System	Process Costing System
<ul style="list-style-type: none"> ■ Collects manufacturing costs and assigns them to a specific job order or batch ■ Measures the cost of each completed unit ■ Uses one Work in Process Inventory account to summarize the cost of all job orders ■ Typically used by companies that make large, unique, or special-order products, such as customized publications, built-in cabinets, and made-to-order draperies 	<ul style="list-style-type: none"> ■ Groups manufacturing costs by process, department, or work cell and then assigns them to products manufactured ■ Measures costs in terms of units completed in a specific time period ■ Uses several Work in Process Inventory accounts, one for each process, department, or work cell ■ Typically used by companies that make large amounts of similar products or liquids, or that have a continuous production flow, such as makers of paint, soft drinks, candy, bricks, or paper

sion or stick shift. Refer to the Focus on International Business about Toyota to learn one way technology is affecting hybrid systems.

If managers learn the terms and procedures used in both the job order and the process costing systems, they can adapt to any operating environment and help design product costing systems that fit their specific information needs.

In recent years, approaches to product costing have continued to change as a result of global competition, technology, and the shifting mix of materials, labor, and overhead in the manufacturing process. The use of multidisciplinary teams of managers has encouraged the exploration of new management accounting practices to improve product costing. Those new practices emphasize the elimination of waste plus the importance of quality, value-added processing, and increased customer satisfaction. Some of the new practices, including the value chain, process value analysis, activity-based management, and the just-in-time operating environment, are discussed in other chapters.

FOCUS ON INTERNATIONAL BUSINESS

Thanks to its virtual production line, Toyota can now make a custom vehicle in five days. Computer software makes it possible to calculate the exact number of parts needed at a precise point on the production line for a certain mix of cars. The mix can be modified as little as five days in advance of actual production, so Toyota can alter a production run for custom orders. Toyota now has the ability to schedule just the right mix of small lots of parts from its suppliers, which arrive at its assembly plants at just the right time, an

average of 24 times a day. When Toyota announced its new approach, GM was taking 17 to 18 days to assemble a custom vehicle and Daimler-Chrysler needed an average of 10 to 12 days.

According to Bruce Belzowski, a senior research associate at the University of Michigan, approximately 75 to 85 percent of cars and light trucks are purchased from dealer inventories. Because most vehicles are not customized but are mass produced either in batches or on continuous flow assembly lines, manufacturers' costing systems may not handle custom orders well. Now, with the capabilities Toyota has gained from its virtual production line, a more hybridized costing system is possible for custom and dealer vehicles.¹

FOCUS ON BUSINESS ETHICS



A tip from the Department of Defense's fraud hotline triggered an audit of The Boeing Co. by the Inspector General, the watchdog agency for the Pentagon. The audit found several examples of overcharging for parts, including charges of \$1.24 for each of 31,108 springs previously priced at five cents and \$403 each for 246 actuator sleeves priced earlier at \$24.72.

Boeing spokesperson Dick Dalton said. "This is a story that looks a whole lot worse than it is." According

to Boeing, the audit quoted prices that dated back 15 to 20 years, when the Pentagon bought and stored large quantities of products. Today, the Pentagon receives small deliveries of parts on short notice, as needed. The new system saves the Pentagon huge amounts in inventory storage costs, but the price per part is higher because of the higher cost of frequent deliveries and on-demand ordering.

The Inspector General, Eleanor Hill, told a Senate Armed Services subcommittee, "We found considerable evidence that the Department of Defense had not yet learned how to be an astute buyer in the commercial marketplace."²

Job Order Costing

OBJECTIVE

3 Explain the cost flow in a job order costing system for a manufacturing company

Remember that a job order costing system is designed to gather costs for a specific order or batch of products to help determine product unit costs. Price setting, production scheduling, and other management tasks related to job orders depend on information from the management information system. This is why it is necessary to maintain a system that gives timely, correct data about product costs.

Because a job order costing system emphasizes cost flow, it is important to understand how costs are incurred, recorded, and transferred within the system. This cost flow, along with the job order cost cards and the subsidiary ledgers for materials and finished goods inventories, forms the core of the job order costing system. Familiarity with the flow of costs enables you to fully understand how the system works.

Cost Flow in a Job Order Costing System for a Manufacturing Company

A basic part of a job order costing system is the set of procedures and accounts used when a company incurs materials, labor, and manufacturing overhead costs. To help control such costs, businesses use various documents to support each transaction. The effective use of procedures and documents generates timely, accurate information for managers.

To study the cost flows in a job order costing system, let's look at how Jon Lyman, the owner of Augusta, Inc., operates the manufacturing part of his business. For the past few years, Lyman has been building golf carts for two markets: custom orders and general purpose. The direct materials costs for a golf cart include the costs of a cart frame, wheels, upholstered seats, a windshield, a motor, and a rechargeable battery. Indirect materials costs include the costs of upholstery zippers, cloth straps to hold equipment in place, wheel lubricants, screws and fasteners, and silicon to attach the windshield. Direct labor costs include the wages of the two workers who assemble the golf carts. Indirect labor costs include the costs associated with moving materials to the production area and inspecting the golf

carts during construction. In addition to indirect materials and indirect labor costs, manufacturing overhead costs include depreciation on the manufacturing plant and equipment used to make the golf carts, as well as utilities, insurance, and property taxes related to the manufacturing plant. Referring to Exhibit 1 will help you picture the flow of each cost in the following discussion. Notice that all three inventory accounts have subsidiary ledgers backing up their totals. The beginning balance in Materials Inventory means there are already direct and indirect materials in the materials storeroom. (Cost information about individual materials is contained in the materials ledger.) The beginning balance in Work in Process Inventory means Job CC is in production (with specifics given in the job order cost cards). The zero beginning balance in Finished Goods Inventory means all previously completed golf carts have been shipped.

MATERIALS When Augusta receives or expects to receive a sales order from a customer, the purchasing process begins with a request for specific quantities of direct and indirect materials that are needed but are not currently available in the materials storeroom. When the new materials arrive at Augusta, accounting will use the supplier's invoice to make an entry to increase the balance of the Materials Inventory account to record the materials purchased.

During the period, Augusta made two purchases. In **Transaction 1**, the company purchased cart frames costing \$572 and wheels costing \$340 from one of its vendors. As shown in Exhibit 1, these purchases increase the balances in the Materials Inventory account by \$912 and the corresponding accounts in the materials ledger. In **Transaction 2**, indirect materials costing \$82 were purchased from another vendor. This purchase also increases the balance in the Materials Inventory account and increases the balance in the Indirect Materials account in the materials ledger. When golf carts are scheduled for production, direct materials are sent to the production area. **Transaction 3** shows the request for materials for the production of two jobs. Of the \$1,880 of direct materials requested, the materials ledger shows that \$1,240 was for cart frames and \$640 was for wheels. Job CC, a batch run of general-purpose golf carts already in production, required \$1,038 of the additional direct materials. Job JB, a custom-order golf cart made to the specifications of an individual customer, required \$842 of direct materials. Notice that the \$1,880 of direct materials requested appears as a debit in the Work in Process Inventory account because that account records the costs of units in process—that is, units started but not completed. The cost of direct materials requested is also recorded on the corresponding job order cost cards. In addition, **Transaction 3** accounts for the \$96 of indirect materials requested for production. Because the \$96 was for indirect materials rather than direct materials, it flows to the Manufacturing Overhead account instead of to a specific job order cost card in work in process inventory.

LABOR Augusta's two production employees assemble golf carts. Several other employees support the production process by moving materials and inspecting the products. **Transaction 4** shows the total cost of wages earned during the period by all those employees as a \$2,400 debit to the Factory Payroll account. (The corresponding credit, which is not shown, is made to Augusta's Wages Payable account.) Factory Payroll is a clearing account, which means that it holds costs for only a short time, until they are distributed to the various production accounts. This distribution is shown in **Transaction 5**. Job CC required \$1,320 of direct labor, and Job JB required \$320. The total direct labor cost of \$1,640 (\$1,320 + \$320) is also shown as a debit to Work in Process Inventory because that account records the costs of units while they are being processed. The indirect labor of \$760 shown in **Transaction 5** flows to the Manufacturing Overhead account instead of to a particular job.

Exhibit 1**The Job Order Costing System—Augusta, Inc.**

Materials Inventory	
Beg. Bal.	1,230
(1) Purchases	912
(2) Purchases	82
End. Bal.	248

Factory Payroll	
(4) Wages Earned	2,400
Direct Labor	1,640 (5)
Indirect Labor	760 (5)

Manufacturing Overhead	
(3) Indirect Materials Used	96
(5) Indirect Labor	760
(6) Other	295
(7) Adjustment	240
	1,391
(11) To close	3
	1,394

Work in Process Inventory	
Beg. Bal.	400
(3) Direct Materials Used	1,880
(5) Direct Labor	1,640
(8) Overhead	1,394
End. Bal.	1,434

Completed 3,880 (9)

SUBSIDIARY LEDGERS**MATERIALS LEDGER**

Cart Frames	
Beg. Bal.	830
(1) Purchases	572
End. Bal.	162

Wheels	
Beg. Bal.	370
(1) Purchases	340
End. Bal.	70

Indirect Materials	
Beg. Bal.	30
(2) Purchases	82
End. Bal.	16

JOB ORDER COST CARDS

Job CC	
Costs from the previous period	400
Direct Materials	1,038
Direct Labor	1,320
Manufacturing Overhead	1,122
Completed Cost	<u>3,880</u>

Job JB	
Direct Materials	842
Direct Labor	320
Manufacturing Overhead	272
Ending Balance	<u>1,434</u>

MANUFACTURING OVERHEAD Thus far, indirect materials and indirect labor have been the only costs debited to the Manufacturing Overhead account. Other indirect production costs, such as utilities, property taxes, insurance, and depreciation, are also charged to the Manufacturing Overhead account as they are incurred during the period. **Transaction 6** shows that other indirect costs amounting to \$295 were paid for during the period. **Transaction 7** records the \$240 adjustment for factory-related depreciation during the period.

Finished Goods Inventory

Beg. Bal.	—		
(9) Completed During Period	3,880	Sold	1,940 (10)
End. Bal.	1,940		

Cost of Goods Sold

(10) Sold During Period	1,940	Adjustment	3 (11)
End. Bal.	1,937		

Finished Goods Ledger**Job CC**

Beg. Bal.	—	Sold	1,940 (10)
(9) Completed	3,880		
End. Bal.	1,940		

During the period, to recognize all product-related costs for a job, an overhead cost estimate is applied using a predetermined rate. Augusta, based on its budget and past experience, currently uses a predetermined overhead rate of 85 percent of direct labor cost. In **Transaction 8**, total manufacturing overhead of \$1,394 is applied, with \$1,122 going to Job CC (85 percent of \$1,320) and \$272 to Job JB (85 per cent of \$320). Notice that the Work in Process Inventory account is debited for \$1,394 because it records the balance of partially completed units of product.

COMPLETED UNITS When a custom job or a batch of golf carts is completed, the products are moved from the manufacturing area to the finished goods storeroom until their scheduled delivery date. As shown in **Transaction 9**, when Job CC is completed and is moved from production to the finished goods storeroom, its cost of \$3,880 is transferred from the Work in Process Inventory account to the Finished Goods Inventory account. Its **job order cost card**, the document on which all costs incurred during the production of a particular job order are recorded, is also completed and transferred to the finished goods file. Figure 2 shows the job order cost card for Job CC. Notice that the product unit cost for each general-purpose golf cart in the job is computed.

SOLD UNITS Two accounting entries are made when golf carts are sold under a perpetual inventory system, which is the system Augusta uses. One is made as a result of the sales invoice and records the quantity and selling price of the products sold. This entry, which is not shown in Exhibit 1, is a debit to the Accounts Receivable or Cash account and a credit to the Sales account. The other entry, prompted by the delivery of product to the customer, records the quantity and cost of the products shipped. In **Transaction 10**, the \$1,940 cost of the general-purpose golf cart sold during the period is transferred from the Finished Goods Inventory account to the Cost of Goods Sold account.

RECONCILIATION OF MANUFACTURING OVERHEAD At year end, the actual manufacturing overhead cost for the period (\$1,391) and the estimated manufacturing overhead that was applied during the period (\$1,394) are reconciled for the preparation of financial statements. In **Transaction 11**, the Manufacturing Overhead account is closed by transferring its balance of \$3 to the Cost of Goods Sold account. Because the applied overhead exceeded the actual overhead by \$3, Cost of Goods Sold must be reduced by the amount of the overcharge. It will then reflect the actual overhead costs incurred. Given that the amount is minor, the company prefers to transfer it to the Cost of Goods Sold account rather than trace it back to the individual units worked on during the period.

The Job Order Cost Card

OBJECTIVE

4 Prepare a job order cost card and compute a job order's product unit cost

As shown in the discussion of Exhibit 1, job order cost cards play a key role in the job order costing system. Because all manufacturing costs are accumulated in the Work in Process Inventory account, a separate accounting procedure is needed to relate those costs to specific jobs. The solution is a subsidiary ledger made up of job order cost cards. Each job being worked on has a job order cost card. As costs are incurred, they are classified by job and recorded on the appropriate job order cost card.

The job order cost card for Job CC is shown in Figure 2. The card has space for direct materials, direct labor, and manufacturing overhead costs. It also includes the job order number, product specifications, the name of the customer, the date of the order, the projected completion date, and a cost summary. As each job incurs direct materials and direct labor costs, its job order cost card is updated. Manufacturing overhead, as applied, is also posted to the job order cost card. Job order cost cards for incomplete jobs make up the subsidiary ledger for the Work in Process Inventory account. To ensure correctness, the ending balance in the Work in Process Inventory account is compared with the total of the costs shown on the job order cost cards.

Computing Product Unit Costs

Product unit costs are fairly simple to calculate in a job order costing system. All costs of direct materials, direct labor, and manufacturing overhead are recorded on

Figure 2
Job Order Cost Card—
Manufacturing Company

JOB ORDER COST CARD			
Augusta, Inc. Spring Hill, Florida			
Customer: <u>Stock</u>	Batch: <u>X</u>	Job Order: <u>CC</u>	
Specifications: <u>Two general-purpose golf carts</u>			
Date of Order: <u>2/26/07</u>			
Date of Completion: <u>3/6/07</u>			
Costs Charged to Job	Previous Months	Current Month	Cost Summary
Direct Materials	\$165	\$1,038	\$1,203
Direct Labor	127	1,320	1,447
Manufacturing Overhead (85% of direct labor cost)	108	1,122	1,230
Totals	<u>\$400</u>	<u>\$3,480</u>	<u>\$3,880</u>
Units Completed			<u>2</u>
Product Unit Cost			<u>\$1,940</u>

a job order cost card as a job progresses toward completion. When a job is finished, the costs on its job order cost card are totaled. The product unit cost is computed by dividing the total costs for the job by the number of good units produced.

The costs for completed Job CC are shown on the job order cost card in Figure 2. Two golf carts were produced at a total cost of \$3,880, and so the product unit cost was \$1,940. One of the golf carts was sold, and the other remained in finished goods inventory. Recall that at year end, it was discovered that manufacturing overhead amounting to \$3 had been overapplied. Because the amount was small, the entire \$3 was subtracted from the cost of the cart that was sold. That adjustment is shown in Exhibit 1 as a \$3 deduction from the Cost of Goods Sold account (Transaction 11), so that the ending balance of that account is \$1,937. The cost of the other golf cart remains in the Finished Goods Inventory account at the full product unit cost of \$1,940.

FOCUS ON BUSINESS PRACTICE



BrightHouse, a 17-person Atlanta-based company, is known as the slowest company its clients will ever meet, and one of the most expensive. To generate breakthrough ideas for its clients, BrightHouse

will work with only one client at a time. The price tag for this exclusive ten-week relationship is high, at least \$500,000. Clients such as Coca-Cola, Holiday Inn, Home Depot, and Coty, Inc., have willingly engaged the firm to reap the benefits of its deliberate four-step process—investigation, incubation, illumination, and illustration—to develop great ideas. As Joey Reiman, CEO of BrightHouse, tells his clients, “You only have to see us once.”³

Job Order Cost Card for a Service Organization

Many service organizations, like BrightHouse in the preceding Focus on Business Practice, use job order costing to compute the cost of providing their services. The only significant difference between service and manufacturing organizations is that in service organizations, costs are not associated with a physical product that can be assembled, stored, and valued. Services are rendered and cannot be held in inventory. Examples of services include auto repair, swimming pool maintenance, income tax return preparation, Red Cross disaster relief, and medical care. Because service organizations do not manufacture products, they have little or no cost for materials. The most important cost in a service organization is labor, which is carefully accounted for through the use of time cards.

The cost flow for services is similar to the cost flow for manufactured products. Job order cost cards are used to keep track of the costs incurred for each job. Job costs include labor, materials and supplies, and service overhead. For many service organizations, each job is based on a contract that requires the customer to pay for all costs incurred plus a predetermined amount of profit. Such contracts are called **cost-plus contracts**, and the “plus” provides a profit based on the amount of costs incurred. When the job is complete, the costs on the completed job order cost card become the cost of services. The cost of services is adjusted at the end of the accounting period for the difference between the applied service overhead costs and the actual service overhead costs.

For example, Gartner Landscaping Services employs 15 people and serves the San Francisco Bay area. The company earns its revenue from designing and installing landscapes for homes and offices. The job order cost card for the Rico Corporation’s landscaping job is shown in Figure 3. Costs have been categorized into three separate activities: Landscape Design, Landscape Installation, and Job-Site Cleanup. Costs have been tracked to the Rico Corporation job for its duration, and now that the job is finished, it is time to complete the job order cost card. The service overhead charge for Landscape Design is 40 percent of design labor cost, and the service overhead cost for Landscape Installation is 50 percent of installation labor cost. Total costs incurred for this job were \$5,400. The cost-plus contract has a 15 percent profit guarantee; therefore, \$810 of profit margin is added to the total cost to arrive at the total contract revenue of \$6,210, which is the amount billed to Rico.

The Process Costing System

OBJECTIVE

5 Explain the product flow and the cost flow in a process costing system

As discussed earlier, a process costing system is used by businesses that produce large amounts of similar products or liquids, or that have a continuous production flow. In such production processes, it is difficult to determine when one batch ends and another begins.

Production Flows in a Process Costing System

In companies that use process costing, the steps in the production process can be combined in hundreds of ways. Two basic production flows are illustrated in Figure 4. Example 1 shows a series of three processing steps, or departments. The completed product from one department becomes the direct materials for the next

Figure 3
Job Order Cost Card—
Service Organization

JOB ORDER COST CARD			
Gartner Landscaping Services			
Customer:	<u>Rico Corporation</u>		
Job Order Number:			
Contract Type:	<u>Cost-Plus</u>		
Type of Service:	<u>Landscape Corporate Headquarters</u>		
Date Completed:	<u>May 31, 20xx</u>		
Costs Charged to Job	Previous Months	Current Month	Total Cost
Landscape Design			
Supplies	\$ 100	\$ -	\$ 100
Design Labor	850	-	850
Service Overhead (40% of design labor)	340	-	340
Totals	<u>\$1,290</u>	<u>\$ -</u>	<u>\$1,290</u>
Landscape Installation			
Planting Materials	\$ 970	\$1,200	\$2,170
Installation Labor	400	620	1,020
Service Overhead (50% of installation labor)	200	310	510
Totals	<u>\$1,570</u>	<u>\$2,130</u>	<u>\$3,700</u>
Job-Site Cleanup			
Janitorial Service Cost	\$ 90	\$ 320	\$ 410
Totals	<u>\$2,950</u>	<u>\$2,450</u>	<u>\$5,400</u>
Cost Summary to Date	Total Cost		
Landscape Design	\$ 1,290		
Landscape Installation	3,700		
Job-Site Cleanup	410		
Totals	<u>\$5,400</u>		
Profit Margin (15%)	810		
Contract Revenue	<u>\$6,210</u>		

department. Such a production flow can include from two to a dozen or more departments or processes. The product unit cost is the sum of the cost elements in all departments.

Example 2 in Figure 4 shows a different kind of production flow. Again there are three departments, but the product does not flow through all the departments in a simple 1-2-3 order. Instead, two separate products are developed, one in Department X and the other in Department Y. Both products then go to Department Z, where they are joined with a third direct material, Material AH. The unit cost transferred to the Finished Goods Inventory account when the products are completed includes cost elements from Departments X, Y, and Z.

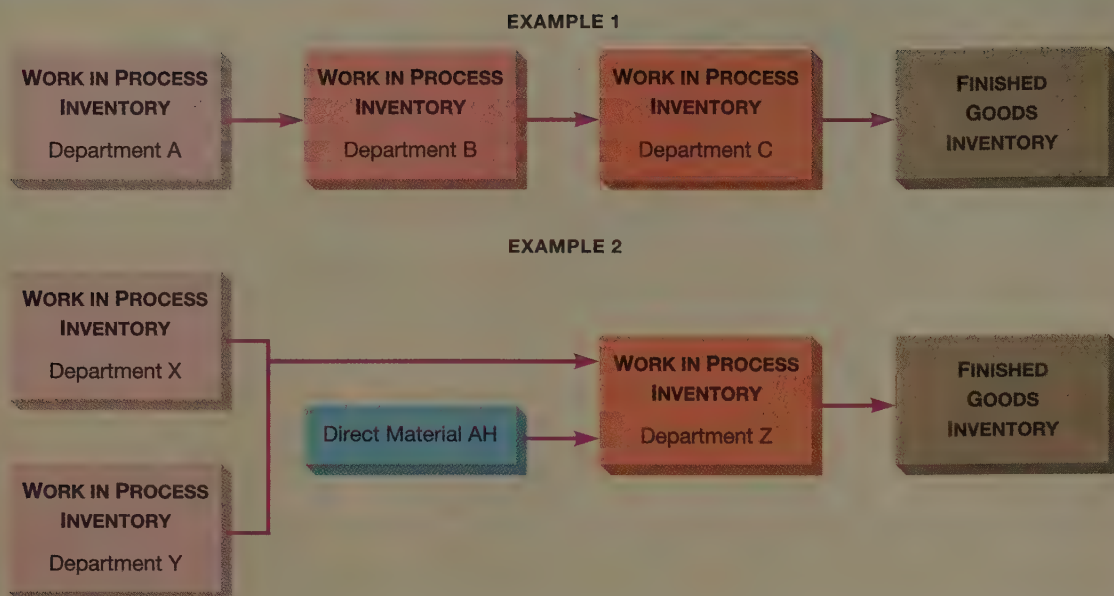


Figure 4
Production Flows for Process Costing

Cost Flows in a Process Costing System

Because of the nature of a process industry, products flow in a first-in, first-out (FIFO) pattern. In a FIFO production flow, the first item that enters the process must be the first one completed. The production flows diagrammed in Figure 4 are based on a FIFO pattern.

In process costing, costs are assigned to products using the **FIFO costing method**. Under this method, the cost flow follows the logical flow of production: and the costs assigned to the first materials processed in a department are the first costs transferred out when those materials flow to the next department.

FOCUS ON BUSINESS PRACTICE



There are many types of business for which process costing is appropriate. Some examples of industries and companies in which process costing systems would be common are:

Aluminum
Beverages
Building Materials
Chemicals

Alcoa, Inc.
Coors
Owens Corning
Engelhard Corporation

Computers
Containers
Electrical Equipment
Foods
Iron and Steel
Machinery
Manufacturing

Oil and Gas
Paper Products
Photography
Textiles

Apple Computer
Crown Cork & Seal
Emerson Electric
Kellogg Company
Bethlehem Steel
Caterpillar Inc.
Minnesota Mining & Manufacturing
Sunoco, Inc.
Boise Cascade
Eastman Kodak
Fruit of the Loom, Ltd.

The Process Cost Report

OBJECTIVE

6 Prepare a process cost report

A **process cost report** is a three-part report that managers use to track and analyze costs in a process costing system. The process cost report consists of the schedule of equivalent production, the unit cost analysis schedule, and the cost summary schedule.

Equivalent Production

A key feature of a process costing system is the computation of equivalent units of production for each process, department, or work cell for each accounting period. This computation must be done before product unit costs can be computed. In process costing, an averaging approach is used. No attempt is made to associate costs with particular job orders. Instead, all manufacturing costs incurred in a process, department, or work cell during a period are divided by the units produced during that period. There are, however, several important questions to answer about the number of units produced. Exactly how many units were produced? Do we count only those units completed during the period? What about partly completed units in the beginning work in process inventory? Do we count them even if only part of the work needed to complete them was done during the period? And what about products in the ending work in process inventory? Is it proper to focus on only those units started and completed during the period?

The answers to all these questions relate to the concept of equivalent production. **Equivalent production** (also called *equivalent units*) is a measure of the number of equivalent whole units produced in a period of time. This measure restates partly completed units in terms of equivalent whole units. The number of equivalent units produced is equal to the sum of (1) total units started and completed during the period and (2) an amount representing the work done on partially completed products in both the beginning and the ending work in process inventories. A percentage of completion factor is applied to partially completed actual units to calculate the number of equivalent whole units.

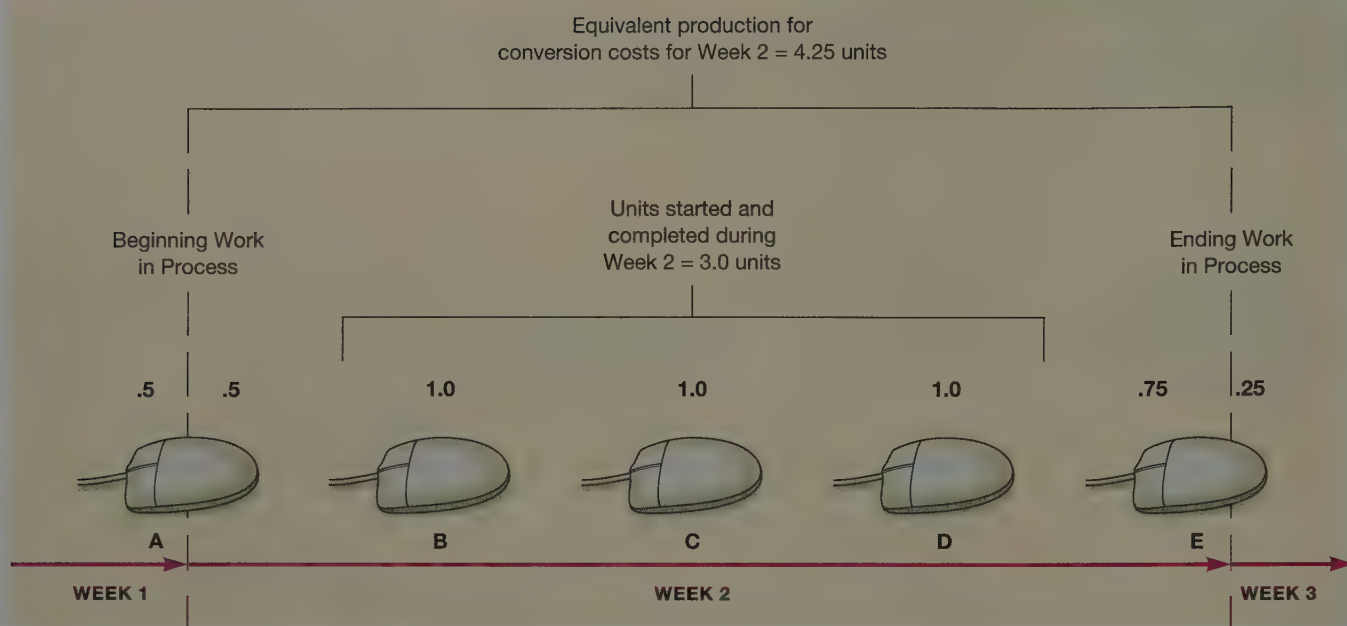
Equivalent production must be computed separately for direct materials and conversion costs because the two costs are incurred in different ways when a product is made. Direct materials are usually added to production at the beginning of the process. **Conversion costs**, which are the combined total costs of direct labor and manufacturing overhead, are often incurred uniformly throughout the production process. Thus, it is convenient to combine direct labor and manufacturing overhead when determining unit cost.

We will explain the computation of equivalent production by using a simplified example. Kernan Computer Products Company makes computer mice. As illustrated in Figure 5, the company started Week 2 with one half-completed mouse in process. During Week 2, the company started and completed three mice, and at the end of Week 2, it had one mouse that was three-quarters completed.

EQUIVALENT PRODUCTION FOR DIRECT MATERIALS We will first consider the use of direct materials. At Kernan, all direct materials are added at the beginning of production. As a result, the mouse that was half-completed at the beginning of Week 2 had had all its direct materials added during the previous week. At the beginning of Week 2, it was already 100 percent complete with regard to direct materials, and no further direct materials were added.

During Week 2, work began on four new mice—the three mice that were completed at week's end and the mouse that was three-quarters completed. Because all direct materials are added at the beginning of the production process, at the end of

Figure 5
Computation of Equivalent Production



Conversion costs (the cost of direct labor and manufacturing overhead) are incurred uniformly as each computer mouse moves through production. Equivalent production for Week 2 is 4.25 units for conversion costs. But direct materials costs are all added to production at the beginning of the process. Because four computer mice entered production in Week 2 (computer mice B, C, D, and E), equivalent production for the week is 4.0 units for direct materials costs.

Week 2, all four mice are 100 percent complete with regard to direct materials. Thus, for Week 2, the equivalent production for direct materials is 4.0 units. This includes direct materials for both the 3.0 units that were started and completed and the 1.0 unit that was three-quarters completed in ending work in process inventory.

EQUIVALENT PRODUCTION FOR CONVERSION COSTS Conversion costs are incurred uniformly throughout the production process. Thus, during Week 2, the equivalent production for conversion costs has three components: the cost to finish the half-completed unit in beginning work in process inventory (.5), the cost to begin and finish three completed units (3.0), and the cost to begin work on the three-quarters-completed unit in ending work in process inventory (.75). For Week 2, the total equivalent production for conversion costs is 4.25 units (.5 + 3.0 + .75).

Now that you understand the concept of equivalent production, we can examine a more realistic example. In practice, Kernan would make many more computer mice during an accounting period and would have many more partially completed mice in its beginning and ending work in process inventories. The number of partially completed mice would be so great that it would be impractical to take a physical count of them. So, instead of taking a physical count, Kernan would estimate an *average* percentage of completion for all computer mice in process.

The Schedule of Equivalent Production

Companies use a **schedule of equivalent production** to compute a period's equivalent production for both direct materials costs and conversion costs. The Kernan Company's schedule of equivalent production is shown in Part A of the process cost report in Exhibit 2.

Exhibit 2

Process Costing Approach: FIFO Method

Kernan Computer Products Company
Process Cost Report—Computer Mice
For the Month Ended February 28, 20x3

A. Schedule of Equivalent Production*		Equivalent Units	
		Direct Materials Costs	Conversion Costs
Beginning inventory—units started last period but completed in this period	6,200	—	
Direct materials costs—100% complete			
Conversion costs—60% complete (40% × 6,200)			2,480
Units started and completed in this period	52,500	52,500	52,500
Ending inventory—units started but not completed in this period	5,000		
Direct materials costs—100% complete		5,000	
Conversion costs—45% complete (45% × 5,000)			2,250
Totals	63,700	57,500	57,230

B. Unit Cost Analysis Schedule		Equivalent Units	
		Direct Materials Costs	Conversion Costs
Total Cost Analysis	Costs from Beginning Inventory	Current Period Costs	Total Costs to Be Accounted For
Direct materials costs	\$20,150	\$189,750	\$209,900
Conversion costs	21,390	320,488	341,878
Totals	\$41,540	\$510,238	\$551,778
Computation of Equivalent Unit Costs	Current Period Costs	÷ Equivalent Units	= Cost per Equivalent Unit
Direct materials costs	\$189,750	57,500	\$3.30
Conversion costs	320,488	57,230	5.60
Totals	\$510,238		\$8.90

C. Cost Summary Schedule		Equivalent Units	
		Direct Materials Costs	Conversion Costs
Beginning inventory			
Costs from preceding period	\$ 41,540		
Costs to complete this period			
Direct materials costs: none	—		
Conversion costs: 2,480 units × \$5.60	13,888		
Subtotal	\$ 55,428		
Units started and completed			
52,500 units × \$8.90	467,250		
Ending inventory*			
Direct materials costs: 5,000 units × \$3.30		\$16,500	
Conversion costs: 2,250 units × \$5.60		12,600	
Totals	\$522,678	\$29,100	\$551,778

*If there is no beginning inventory, the computations are the same, except that there are no units for beginning inventory.

Part A of Exhibit 2 assumes the following facts for February 20x3:

- 6,200 units in beginning work in process inventory, 60 percent complete
- 52,500 units started and completed during the period, 100 percent complete
- 5,000 units in ending work in process inventory, 45 percent complete

Being careful to account for only the work that was done in February, Kernan completes its schedule of equivalent production for February 20x3 as follows.

BEGINNING INVENTORY All direct materials are added at the beginning of the production process. Thus, the 6,200 partially completed units that began February as work in process were already 100 percent complete with regard to direct materials, and no further direct materials were added. Unlike direct materials costs, conversion costs are incurred uniformly throughout the production process. The 6,200 partial units were 60 percent complete with regard to conversion costs at February 1. To complete those units, the remaining 40 percent of conversion costs were incurred during February. Thus, the equivalent production for conversion costs in February for these units is 2,480 units ($40\% \times 6,200$). That amount is entered in the far right column.

UNITS STARTED AND COMPLETED IN THIS PERIOD The costs of the 52,500 units started and completed during February were all incurred during this accounting period. Thus, the full amount of 52,500 is entered as the equivalent units for both direct materials costs and conversion costs.

ENDING INVENTORY Because all direct materials are added at the beginning of the production process, the 5,000 mice in process at the end of February are 100 percent complete in regard to direct materials. The full amount of 5,000 is thus entered as the equivalent units for direct materials costs. However, conversion costs are incurred uniformly throughout the production process. The 5,000 mice in ending inventory are only 45 percent complete in terms of conversion costs. As a result, the amount of 2,250 equivalent units ($45\% \times 5,000$) is entered in the far right column.

TOTALS The schedule of equivalent production is completed by summing all units to be accounted for, all equivalent units for direct materials costs, and all equivalent units for conversion costs. Part A of Exhibit 2 shows that for the month of February, Kernan needed to account for a total of 63,700 units. Equivalent units for direct materials costs totaled 57,500, and equivalent units for conversion costs totaled 57,230. Once Kernan knows February's equivalent unit amounts, it can complete the other two parts of the process cost report and compute the month's unit costs.

The Unit Cost Analysis Schedule

Thus far we have focused on accounting for *units* of productive output—in our example, computer mice. We now turn to cost information. The **unit cost analysis schedule**, which is Part B in Exhibit 2, is used to accumulate all costs charged to the Work in Process Inventory account of each production process, department, or work cell, and to compute the cost per equivalent unit for direct materials costs and conversion costs. A unit cost analysis schedule has two sections: the total cost analysis and the computation of equivalent unit costs.

The following additional information about the manufacture of computer mice is available for February 20x3:

Costs from beginning inventory	
Direct materials costs	\$ 20,150
Conversion costs	21,390
Current period costs	
Direct materials costs	189,750
Conversion costs	320,488

This information enables us to complete the unit cost analysis schedule. As shown in Exhibit 2, all costs for the period are accumulated in the section of the schedule called "Total Cost Analysis." Included are the direct materials costs and conversion costs from beginning inventory and the direct materials costs and conversion costs incurred during the current period. All direct materials costs and conversion costs for the period are summed in the Total Costs to Be Accounted For column. Total mouse-related costs to be accounted for equal \$551,778, which is the sum of \$209,900 in direct materials costs and \$341,878 in conversion costs.

In the second section of the unit cost analysis schedule, the section called "Computation of Equivalent Unit Costs," the costs of making the products during the current period are computed. Thus, *only costs incurred in the current period* are used. The direct materials costs and conversion costs for the period are divided by their respective units of equivalent production for the period to arrive at the cost per equivalent unit. The second section of Part B shows that the total cost of \$8.90 per equivalent unit consists of \$3.30 per equivalent unit for direct materials costs ($\$189,750 \div 57,500$ equivalent units) plus \$5.60 per equivalent unit for conversion costs ($\$320,488 \div 57,230$ equivalent units). Note that the equivalent units were taken from the schedule of equivalent production in Part A of Exhibit 2.

Costs attached to units in beginning inventory are *not* included in the computation of equivalent unit costs. Under the FIFO cost flow assumption, separate costing analyses are used for each accounting period. Therefore, costs attached to beginning inventory are treated separately, in the cost summary schedule.

The Cost Summary Schedule

The final phase of the process costing analysis is to prepare the **cost summary schedule**, shown as Part C in Exhibit 2. This schedule is used to determine the costs to be transferred to the Finished Goods Inventory account of a production process, department, or work cell and the ending balance in the Work in Process Inventory account. The information in this schedule comes from the schedule of equivalent production and the unit cost analysis schedule.

Continuing the example of computer mice, Part C of Exhibit 2 shows that the costs transferred to the Finished Goods Inventory account included \$41,540 attached to the 6,200 units in beginning inventory, the costs of completing the units in beginning inventory, and the costs of producing the 52,500 units started and completed during February. Part A of Exhibit 2 shows that 2,480 equivalent units of conversion costs were required to complete the 6,200 units in the beginning work in process inventory. Because the equivalent unit conversion cost for February is \$5.60, the cost to complete the units carried over from January was \$13,888 ($2,480 \text{ units} \times \5.60). The 52,500 units started and completed in February each cost \$8.90 to produce. Their combined cost of \$467,250 is added to the \$55,428 required to produce the 6,200 units from beginning inventory to arrive at the total of \$522,678 transferred to the Finished Goods Inventory account.

All costs remaining in the Work in Process Inventory account for computer mice after the costs of completed units have been transferred out represent the costs of the mice still in production at the end of February. As shown in Part C of Exhibit 2, the ending Work in Process Inventory balance of \$29,100 is made up of \$16,500

of direct materials costs ($5,000 \text{ units} \times \3.30 per unit) and \$12,600 of conversion costs ($5,000 \text{ units} \times 45 \text{ percent} \times \5.60 per unit). Note that the unit figures come from the schedule of equivalent production (Part A of Exhibit 2).

When the cost summary schedule is completed, a computational check is performed, as shown in the last line of Exhibit 2. The total cost of completed units transferred to the Finished Goods Inventory account is added to the costs of unfinished units in the Work in Process Inventory account to arrive at the total costs to be accounted for. This figure is compared with the total costs to be accounted for in the unit cost analysis schedule (Part B). The two totals should be equal, except possibly for a minor difference due to rounding. In Exhibit 2, the two figures are the same, so we know that all costs of the computer mice have been accounted for and that no calculation errors were made in the February cost analysis.

Using Information About Product Cost to Evaluate Performance

OBJECTIVE

7 Evaluate operating performance using information about product cost

The job order and process costing systems provide valuable information to managers. Both systems provide unit costs that can be used in determining a product's price. In addition, the information supplied by the two systems is used to compute the balances in the Materials Inventory, Work in Process Inventory, and Finished Goods Inventory accounts on the balance sheet and the cost of goods sold on the income statement.

Both the job order and the process costing systems supply managers with much more information that is useful in tracking and evaluating operating performance. The following measurements help managers analyze operating efficiency:

- Cost trends of a product or product line
- Units produced per time period
- Materials usage per unit produced
- Labor cost per unit produced
- Special order needs of customers
- Comparisons of the cost-effectiveness of changing to a more advanced production process

Cost trends can be developed from product cost data over several time periods. Such trends can help managers identify areas of rising costs or areas where cost-effectiveness has improved. Tracking units produced per time period, a figure that is easily pulled from a product cost analysis, can help managers evaluate operating efficiency.

Direct materials and labor costs are significant parts of a product's cost and should be monitored constantly. Trends in direct materials usage and labor costs per unit produced can help managers determine optimal resource usage.

Anticipating customers' needs is very important to managers. Job order cost cards summarize the amount, costs, and type of product a specific customer has ordered. By tracking such information, managers can see which customers are increasing their orders and which are reducing them and can take action to improve customer relations.

Finally, decisions to purchase new, automated machinery and equipment are often based on the savings that the change is expected to produce. Managers can estimate product unit costs for the new equipment and compare them with cost trends for the existing equipment to decide whether to make a purchase.

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

- 1. Discuss the role information about costs plays in the management cycle and explain why product unit cost is important.** During the planning stage, information about costs helps managers develop budgets, establish prices, set sales goals, plan production volume, estimate product or service unit costs, and determine human resource needs. During the executing stage, managers make decisions about controlling costs, managing the company's volume of activity, assuring quality, and negotiating prices. During the reviewing stage, managers compare actual and targeted information to evaluate performance plus adjust future planning and decision-making strategies. During the reporting stage, unit costs are used to determine inventory balances and the cost of goods or services sold for the financial statements. Internal reports comparing the organization's chosen measures of actual and targeted performance are also prepared to help managers determine whether cost goals for products or services are being achieved.
- 2. Distinguish between the different types of product costing systems and identify the information each provides.** The job order costing system is a product costing system used by companies that make large, unique, or special-order products. Under such a system, the costs of direct materials, direct labor, and manufacturing overhead are traced to a specific job order or batch of products. Job order costing measures the cost of each complete unit and summarizes the cost of all jobs in a single Work in Process account that is supported by job order cost cards.

A process costing system is a product costing system used by companies that produce large amounts of similar products or liquids, or that have a continuous production flow. Under such a system, the costs of direct materials, direct labor, and manufacturing overhead are first traced to a process, department, or work cell. Then these costs are assigned to the products manufactured by that process, department, or work cell. Process costing uses several Work in Process Inventory accounts, one for each department, process, or work cell.
- 3. Explain the cost flow in a job order costing system for a manufacturing company.** The costs of materials are first charged to the Materials Inventory account and to the respective materials accounts in the subsidiary ledger. Labor costs are accumulated in the Factory Payroll account. The various manufacturing overhead costs are charged to the Manufacturing Overhead account. As products are manufactured, the costs of direct materials and direct labor are transferred to the Work in Process Inventory account and are recorded on the job's job order cost card. Manufacturing overhead costs are applied and charged to the Work in Process Inventory account using a predetermined overhead rate. Those charges are used to reduce the balance in the Manufacturing Overhead account. They too are recorded on the job's job order cost card. When products and jobs are complete, the costs assigned to them are transferred to the Finished Goods Inventory account. Then, when the products are sold and shipped, their costs are transferred to the Cost of Goods Sold account.
- 4. Prepare a job order cost card and compute a job order's product unit cost.** All costs of direct materials, direct labor, and manufacturing overhead for a particular job are accumulated on a job order cost card. When the job has been completed, those costs are totaled. The total is then divided by the number of good units produced to find the product unit cost for that order. The

product unit cost is entered on the job order cost card and used to value items in inventory.

Service organizations can use job order cost cards to track the costs of labor, supplies, and service overhead to specific customer jobs. At many service organizations, each job is based on a cost-plus contract that requires the customer to pay for all costs incurred plus a predetermined amount of profit. Labor is an important cost for service organizations, whereas there are usually few or no materials costs.

5. Explain the product flow and the cost flow in a process costing system. Process costing is used by companies that produce large amounts of similar products or liquids, or that have a continuous production flow. Thus, products and costs flow in a FIFO pattern (first in, first out).

6. Prepare a process cost report. A process cost report is a three-part report that enables managers to track and analyze costs in a process costing system. The three parts are the schedule of equivalent production, the unit cost analysis schedule, and the cost summary schedule. Equivalent units are computed from unit information, including (1) units in the beginning work in process inventory and their percentage of completion, (2) units started and completed during the period, and (3) units in the ending work in process inventory and their percentage of completion. If all direct materials are added at the beginning of the manufacturing process, the partial units in beginning work in process inventory will be 100 percent complete with regard to direct materials, so no direct materials costs are included in the current period's computation of equivalent units. All units started during the period receive the full amount of direct materials. Equivalent units for costs added uniformly throughout the process are computed by multiplying the percentage completed in the current period by the total units in the respective categories mentioned above.

Once equivalent production is determined, a company can compute unit costs by using a unit cost analysis schedule. Direct materials costs for units in beginning inventory and direct materials costs for the current period are added. The same procedure is followed for conversion costs. Total costs to be accounted for are found by adding the total direct materials costs and conversion costs. Following FIFO costing procedures, the unit cost for direct materials is found by dividing the direct materials costs for the current period by the equivalent unit amount for direct materials. The same procedure is followed for conversion costs. Then the unit costs for direct materials and conversion costs are added to yield the total unit cost for the period. The first part of the cost summary schedule is used to compute the costs assigned to units completed and transferred out during the period. The cost of producing the units in the beginning inventory is determined by adding the costs transferred in from the preceding period and the conversion costs needed to complete the units during the current period. That amount is added to the total cost of producing all units started and completed during the period. The result is the total cost to be transferred to the Finished Goods Inventory account. The second part of the cost summary schedule assigns costs to units still in process at period end. Unit costs for direct materials and conversion costs are multiplied by their respective equivalent units. The total equals the balance in the Work in Process Inventory account at the end of the period.

7. Evaluate operating performance using information about product cost. Both the job order and the process costing systems supply information that managers can use to track and evaluate the operating performance of an

organization. The following measurements can help managers analyze operating efficiency: cost trends of a product or product line; units produced per time period; materials usage per unit produced; labor cost per unit produced; special order needs of customers; and comparisons of the cost-effectiveness of shifting to a more advanced production process.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- L06 Conversion costs:** The combined total costs of direct labor and manufacturing overhead incurred by a production department.
- L04 Cost-plus contract:** A form of contract that requires the customer to pay for all costs incurred plus a predetermined amount of profit.
- L06 Cost summary schedule:** A process costing schedule that is used to determine the costs to be transferred to the Finished Goods Inventory account of a production process, department, or work cell and the ending balance of the Work in Process Inventory account; the third part of a process cost report.
- L06 Equivalent production:** A measure of the number of equivalent whole units produced in a period of time. Also called *equivalent units*.
- L05 FIFO costing method:** A process costing method in which the cost flow follows the logical flow of production: the costs assigned to the first materials processed in a department are the first costs transferred out when those materials flow to the next department.
- L02 Job order:** A customer order for a specific number of custom designed, made-to-order products.
- L03 Job order cost card:** A document on which all costs incurred during the production of a particular job order are recorded; part of the subsidiary ledger for the Work in Process Inventory account.
- L02 Job order costing system:** A product costing system used by both service organizations and manufacturing companies that make large, unique, or special-order products; the costs of direct materials, direct labor, and manufacturing overhead are traced to a specific job order or batch of products.
- L02 Process costing system:** A product costing system used by companies that produce large amounts of similar products or liquids, or that have a continuous production flow; the costs of direct materials, direct labor, and manufacturing overhead are first traced to processes, departments, or work cells and then assigned to the products produced by those processes, departments, or work cells.
- L06 Process cost report:** A three-part report that managers use to track and analyze costs in a process costing system; it consists of the schedule of equivalent production, the unit cost analysis schedule, and the cost summary schedule.
- L02 Product costing system:** A set of procedures used to account for an organization's product costs and provide timely and accurate unit cost information for pricing, cost planning and control, inventory valuation, and financial statement preparation.
- L06 Schedule of equivalent production:** A process costing schedule in which a period's equivalent units are computed for both materials costs and conversion costs; the first part of a process cost report.
- L06 Unit cost analysis schedule:** A process costing statement used to accumulate all costs charged to the Work in Process Inventory account of each production process, department, or work cell, and to compute cost per equivalent unit for direct materials costs and conversion costs; the second part of a process cost report.

REVIEW PROBLEM

LO 5
LO 6

Process Costing with Beginning Inventories—FIFO Method

The POP Chewing Gum Company produces several flavors of bubble gum. Two basic direct materials, gum base and flavored sweetener, are blended at the beginning of the process. One kilogram of input equals one kilogram of output. Direct labor and manufacturing overhead costs are incurred uniformly throughout the blending process. On July 1, 20x4, 16,000 units were in process. All direct materials had been added, but the units were only 70 percent complete as to conversion costs. Direct materials costs of \$8,100 and conversion costs of \$11,800 are attached to the beginning inventory. During July, 135,000 kilograms of gum base and 270,000 kilograms of flavored sweetener were used at costs of \$122,500 and \$80,000, respectively. Direct labor charges were \$299,200, and manufacturing overhead costs applied during July were \$284,000. The ending work in process inventory was 21,600 kilograms. All direct materials have been added to those units, and 25 percent of the conversion costs have been assigned. Output from the Blending Department is transferred to the Packing Department.

REQUIRED

1. Prepare a process cost report using the FIFO costing method with (a) a schedule of equivalent production, (b) a unit cost analysis schedule, and (c) a cost summary schedule for the Blending Department for July.
2. From the information in the cost summary schedule, identify the amount that should be transferred out of the Work in Process Inventory account, and state where those dollars should be transferred.

ANSWER TO REVIEW PROBLEM

1. Schedule of equivalent production, unit cost analysis schedule, and cost summary schedule prepared (FIFO costing method)

POP Chewing Gum Company Blending Department Process Cost Report For the Month Ended July 31, 20x4

A. Schedule of Equivalent Production

Units—Stage of Completion	Units to Be Accounted For	Equivalent Units	
		Direct Materials Costs	Conversion Costs
Beginning inventory—units started last period but completed in this period	16,000	—	
Direct materials costs—100% complete			
Conversion costs—70% complete (30% × 16,000)			4,800
Units started and completed in this period	383,400*	383,400	383,400
Ending inventory—units started but not completed in this period	21,600		
Direct materials costs—100% complete		21,600	
Conversion costs—25% complete (25% × 21,600)			5,400
Totals	<u>421,000</u>	<u>405,000</u>	<u>393,600</u>

*135,000 + 270,000 – 21,600 = 383,400

B. Unit Cost Analysis Schedule

B. Unit Cost Analysis Schedule		Costs from Beginning Inventory	Current Period Costs	Total Costs to Be Accounted For		
Total Cost Analysis						
Direct materials costs		\$ 8,100	\$202,500	\$210,600		
Conversion costs		<u>11,800</u>	<u>583,200*</u>	<u>595,000</u>		
Totals		<u>\$19,900</u>	<u>\$785,700</u>	<u>\$805,600</u>		
Computation of Equivalent Unit Costs		Current Period Costs	÷	Equivalent Units	=	Cost per Equivalent Unit
Direct materials costs		\$202,500		405,000		\$.50
Conversion costs		<u>583,200</u>		<u>393,600</u>		<u>1.48</u>
Totals		<u>\$785,700</u>				<u>\$1.98</u>

* \$299,200 + \$284,000 = \$583,200

C. Cost Summary Schedule

	Cost of Goods Transferred to Packing Department	Cost of Ending Work in Process Inventory	Total Costs to Be Accounted For
Beginning inventory			
Costs from preceding period	\$ 19,900		
Costs to complete this period			
Direct materials costs			
Conversion costs: 4,800 units × \$1.48	7,104		
Subtotal	\$ 27,004		
Units started and completed			
383,400 units × \$1.98	759,132		
Ending inventory			
Direct materials costs:			
21,600 units × \$.50		\$10,800	
Conversion costs:			
5,400 units × \$1.48		7,992	
Totals	<u>\$786,136</u>	<u>\$18,792</u>	<u>\$804,928*</u>

*Difference due to rounding.

- The amount of \$786,136 should be transferred to the Work in Process Inventory account of the Packing Department.

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. How do manufacturing and service organizations use information about costs during the planning stage of the management cycle?
2. List some kinds of decisions managers make using cost information during the executing stage of the management cycle.
3. How do managers use cost information during the reviewing stage of the management cycle?
4. What is a product costing system?
5. What is a job order costing system? What kinds of companies use such a system?
6. What is a job order?
7. What are the main similarities and differences between a job order costing system and a process costing system? (Focus on the characteristics of each system.)
8. Why is the Manufacturing Overhead account reconciled at year end?
9. What is the purpose of a job order cost card? Identify the kinds of information recorded on that document.
10. Explain how to compute product unit cost in a job order costing system. How are the necessary data accumulated?
11. What is the main difference between a service organization and a manufacturing organization? How does that affect the costing system of a service organization?
12. What three schedules are included in a process cost report?
13. Define the term *equivalent production* (or *equivalent units*).
14. Why must actual unit data be changed to equivalent unit data to cost products in a process costing system?
15. Define the term *conversion costs*. Why are conversion costs used in process costing computations?
16. Why do you think it would be easier to compute equivalent units without units in beginning inventory than with units in beginning inventory?
17. What are the purposes of the unit cost analysis schedule?
18. What two important dollar amounts come from the cost summary schedule? How do they relate to the year-end financial statements?
19. Describe how to check the accuracy of the results in the cost summary schedule.
20. What type of operating performance can be evaluated by (a) units produced per time period, (b) labor cost per unit produced, and (c) special order needs of customers?

SHORT EXERCISES

LO 1 Uses of Product Cost Information

- SE 1.** Kerri's Kennel provides boarding for dogs and cats. Kerri must make several decisions soon. Write *yes* or *no* to indicate whether knowing the cost to board one animal per day (that is, the product unit cost) can help Kerri answer the following questions.

1. Is the boarding fee high enough to cover my costs?
2. How much profit will I make if I board an average of ten dogs per day for fifty weeks?
3. What costs can I reduce so I can compete with the boarding fee charged by my competitor?

LO 2 Job Order Versus Process Costing

- SE 2.** Indicate whether each of the following is a characteristic of job order costing or of process costing.

1. Several Work in Process Inventory accounts are used, one for each process, department, or work cell in the process.
2. Costs are grouped by process, department, or work cell.

3. Costs are measured for each completed job.
4. Only one Work in Process Inventory account is used.
5. Costs are measured in terms of units completed in specific time periods.
6. Costs are assigned to specific jobs or batches of product.

LO 3 Transactions in a Job Order Costing System

SE 3. Enter the following transactions into T accounts.

1. Incurred \$34,000 of direct labor, \$18,000 of indirect labor, and \$7,000 of marketing labor.
2. Applied manufacturing overhead based on 12,680 labor hours at \$6.50 per labor hour.

LO 3 Accounts for Job Order Costing

SE 4. Identify the accounts in which each of the following transactions for Toby's Furniture, a manufacturer of oak tables and chairs, would be recorded.

1. Issued oak materials into production
2. Recorded direct labor time for the first week in February
3. Received indirect materials from a vendor
4. Received a production-related electricity bill in the mail
5. Applied manufacturing overhead to Job ABC
6. Completed but did not yet sell Job ABC

LO 4 Computation of Product Unit Cost

SE 5. Complete the following job order cost card for six custom-built computer systems.

Job order <u>168</u>			
JOB ORDER COST CARD Gatekeeper 3000 Apache City, North Dakota			
Customer	<u>Robert Arthur</u>	Batch	<u> </u> Custom <u> X </u>
Specifications	<u>6 custom computer systems</u>		
Date of order	<u>4/4/x3</u>	Date of Completion	<u>6/8/x3</u>
Costs Charged to Job	Previous Months	Current Month	Cost Summary
Direct materials	\$3,540	\$2,820	\$ <u> </u>
Direct labor	2,340	1,620	<u> </u>
Manufacturing overhead applied	2,880	2,550	<u> </u>
Totals	\$ <u> </u>	\$ <u> </u>	\$ <u> </u>
Units completed			<u> </u>
Product unit cost			\$ <u> </u>

LO 6 Equivalent Production: No Beginning Inventory

SE 6. Given the following information from Blue Blaze's records for July 20x7, compute the equivalent units of production.

Beginning inventory	—
Units started during the period	17,000
Units partially completed	2,500
Percentage of completion of ending work in process inventory	70%

Direct materials are added at the beginning of the process, and conversion costs are added uniformly throughout the process.

LO 6 Equivalent Production: Beginning Inventory

SE 7. Assume the same information as in SE 6, except that there were 3,000 units in beginning work in process inventory, 100 percent complete for direct materials and 40 percent complete for conversion costs. Compute the equivalent units of production for the month.

LO 6 Unit Cost Determination

SE 8. Using the information from SE 6 and the following information, compute the total cost per equivalent unit.

Costs for the period		
Direct materials costs		\$20,400
Conversion costs		32,500

LO 6 Cost Summary Schedule

SE 9. Using the information from SE 6 and SE 8, prepare a cost summary schedule.

LO 7 Measuring Performance with Product Cost Data

SE 10. The following are the weekly average direct materials costs per unit for two products. How could the department manager use this information?

Week	Product A	Product B
1	\$45.20	\$23.90
2	46.10	23.80
3	48.30	23.80
4	49.60	23.60

EXERCISES

LO 2 Product Costing

E 1. Anniversary Printing Company specializes in wedding invitations. Anniversary needs information to budget next year's activities. Write *yes* or *no* to indicate whether each piece of information listed below is likely to be available in the company's product costing system.

1. Cost of paper and envelopes
2. Printing machine setup costs
3. Depreciation of printing machinery
4. Advertising costs
5. Repair costs for printing machinery
6. Costs to deliver stationery to customers
7. Office supplies costs
8. Costs to design a wedding invitation
9. Cost of ink
10. Sales commissions

LO 2 Costing Systems: Industry Linkage

E 2. Which of the following products would typically be accounted for using a job order costing system? Which would be accounted for using a process costing system? (a) paint, (b) automobiles, (c) jet aircraft, (d) bricks, (e) large milling machines, (f) liquid detergent, (g) aluminum compressed-gas cylinders of standard size and capacity, and (h) aluminum compressed-gas cylinders with a special fiberglass overwrap for a Mount Everest expedition.

LO 2 Costing Systems: Industry Linkage

E 3. Which of the following products would typically be accounted for using a job order costing system? Which would be accounted for using a process costing system? (a) standard nails produced from wire, (b) television sets, (c) printed wedding invitations, (d) a limited edition of lithographs, (e) flea collars for pets, (f) high-speed lathes with special-order drill threads, (g) breakfast cereal, and (h) an original evening gown.

LO 3 Work in Process Inventory Account: T Account Analysis

E 4. On July 1, Eartha Specialty Company's Work in Process Inventory account showed a beginning balance of \$29,400. Production activity for July was as follows: (a) Direct materials costing \$238,820 were requested for production. (b) Eartha Specialty Company's total manufacturing payroll for July was \$140,690, of which \$52,490 was

used to pay for indirect labor. (c) Indirect materials costing \$28,400 were purchased and used. (d) Manufacturing overhead was applied at a rate of 150 percent of direct labor costs.

1. Record the materials, labor, and manufacturing overhead costs for July in T accounts.
2. Compute the ending balance in the Work in Process Inventory account. Assume a transfer of \$461,400 to the Finished Goods Inventory account during the period.

- LO 4 Job Order Costs and Computation of Product Unit Cost** **E 5.** During the month of January, the Hoptung Cabinet Company worked on six different job orders for specialty kitchen cabinets. Job A-62, manufactured for Sally's Cabinets, Inc., was begun on January 10 and completed on January 24. Partial data from Job A-62's job order cost card are summarized below.

	Costs	Machine Hours Used
Direct materials:		
Cedar	\$7,900	
Pine	6,320	
Hardware	2,930	
Assembly supplies	988	
Direct labor:		
Sawing	\$2,840	120
Shaping	2,200	220
Finishing	2,250	180
Assembly	2,890	50

A total of 34 cabinets were produced for Job A-62. The current predetermined manufacturing overhead rate is \$21.60 per machine hour. From the information given, prepare a job order cost card and compute the job order's product unit cost. (Round to whole dollars.)

- LO 4 Computation of Product Unit Cost** **E 6.** Using job order costing, determine the product unit cost based on the following costs incurred during March: liability insurance, manufacturing, \$2,500; rent, sales office, \$2,900; depreciation, manufacturing equipment, \$6,100; direct materials, \$32,650; indirect labor, manufacturing, \$3,480; indirect materials, \$1,080; heat, light, and power, manufacturing, \$1,910; fire insurance, manufacturing, \$2,600; depreciation, sales equipment, \$4,250; rent, manufacturing, \$3,850; direct labor, \$18,420; manager's salary, manufacturing, \$3,100; president's salary, \$5,800; sales commissions, \$8,250; and advertising expenses, \$2,975. The Inspection Department reported that 48,800 good units were produced during March. Carry your answer to two decimal places.

- LO 4 Computation of Product Unit Cost** **E 7.** Nanette Corporation manufactures specialty lines of women's apparel. During February, Nanette Corporation worked on three special orders: A-25, A-27, and B-14. Cost and production data for each order are shown in the following table.

	Job A-25	Job A-27	Job B-14
Direct materials:			
Fabric Q	\$10,840	\$12,980	\$17,660
Fabric Z	11,400	12,200	13,440
Fabric YB	5,260	6,920	10,900
Direct labor:			
Garmentmaker	8,900	10,400	16,200
Layout	6,450	7,425	9,210
Packaging	3,950	4,875	6,090
Manufacturing overhead:			
120% of direct labor cost	?	?	?
Number of units produced	700	775	1,482

1. Compute the total cost associated with each job. Show the subtotals for each cost category.
2. Compute the product unit cost for each job. (Round your computations to the nearest penny.)

LO 4 Job Costing in a Service Organization

- E 8.** A job order cost card for Harold Computer Services appears below. Fill in the information that is missing from the card. Harold Computer Services' profit factor is 30 percent of total cost.

JOB ORDER COST CARD Harold Computer Services	
Customer:	Ray Dove
Job Order No.:	
Contract Type:	Cost-Plus
Type of Service:	Software Installation and Internet Interfacing
Date of Completion:	October 6, 20x6
Costs Charged to Job	
Software Installation Services	Total Cost
Installation labor	\$300
Service overhead (? % of installation labor costs)	?
Totals	<u>\$450</u>
Internet Services	
Internet labor	\$200
Service overhead (20% of Internet labor costs)	40
Total	<u>\$?</u>
Cost Summary to Date	
Software Installation Services	Total Cost
Internet Services	\$?
Total	<u>?</u>
Total	<u>\$?</u>
Profit margin (30%)	?
Contract revenue	<u>\$?</u>

LO 5 Product Flow in a Process Costing System

- E 9.** True Color Company uses a process costing system to analyze the costs incurred in making paint. Production of Premium Brand starts in the Blending Department, where materials SM and HA are added to a water base. The solution is heated to 70° Celsius and transferred to the Mixing Department, where it is mixed for one hour. Then the paint goes to the Settling/Canning Department, where it is cooled and put into 4-liter cans. Direct labor and manufacturing overhead charges are incurred uniformly throughout each part of the paint-making process.

In diagram form, show the product flow for Premium Brand paint.

LO 6 Equivalent Units: No Beginning Inventories

- E 10.** Deegan Stone Company produces slumpstone bricks. Though it has been in operation for only twelve months, the company already enjoys a good reputation. During its first year, direct materials for 600,000 bricks were put into production; 586,000 bricks were completed and transferred to finished goods inventory. The remaining bricks were still in process at year end, 60 percent complete. In the company's process costing system, all direct materials are added at the beginning of the process. Conversion costs are incurred uniformly throughout the production process.

From this information, prepare a schedule of equivalent production for the year ending December 31, 20x1. Use the FIFO costing method.

- LO 6 Equivalent Units: Beginning Inventories—FIFO Method**
- E 11.** Olivares Enterprises makes Rainberry Shampoo for professional hair stylists. On July 31, 20x5, 5,200 liters of shampoo were in process, 80 percent complete for conversion costs and 100 percent complete for direct materials costs. During the month of August, 212,500 liters of direct materials were put into production. Data for work in process inventory on August 31, 20x5, were as follows: shampoo, 4,500 liters; state of completion, 60 percent of conversion costs and 100 percent of direct materials content.
- From this information, prepare a schedule of equivalent production for the month. Use the FIFO costing method.

- LO 6 Work in Process Inventory Accounts: Total Unit Cost**
- E 12.** Scientists at Relyea Laboratories, Inc., have just perfected a liquid substance called Dentalite that dissolves tooth decay. The substance, which is generated by a complex process involving five departments, is very expensive. Cost and equivalent unit data for the latest week are as follows (units are in ounces):

Dept.	Direct Materials Costs		Conversion Costs	
	Dollars	Equivalent Units	Dollars	Equivalent Units
A	\$12,000	1,000	\$33,825	2,050
B	21,835	1,985	13,065	1,005
C	23,896	1,030	20,972	2,140
D	—	—	22,086	2,045
E	—	—	15,171	1,945

From these data, compute the unit cost for each department and the total unit cost of producing one ounce of Dentalite.

- LO 6 Unit Cost Determination**
- E 13.** Pittman's Pots, Inc., manufactures sets of heavy-duty cookware. Production has just been completed for August 20x2. At the beginning of August, the Work in Process Inventory account showed direct materials costs of \$31,700 and conversion costs of \$29,400. The cost of direct materials used in August was \$275,373; conversion costs were \$175,068. During the month, 15,190 sets were started and completed. A schedule of equivalent production for August has already been prepared. It shows a total of 16,450 equivalent sets for direct materials costs and 16,210 equivalent sets for conversion costs.
- With this information, prepare a unit cost analysis schedule for August. Use the FIFO costing method.

- LO 6 Cost Summary Schedule**
- E 14.** The Upshaw Bakery produces Healthnut coffee bread. It uses a process costing system for internal recordkeeping. In March 20x9, beginning inventory was 450 units, 100 percent complete for direct materials costs and 10 percent for conversion costs, and had a cost of \$655. Units started and completed during the month totaled 14,200. Ending inventory was 410 units, 100 percent complete for direct materials costs and 70 percent for conversion costs. Unit costs per equivalent unit for March were direct materials costs, \$1.40, and conversion costs, \$.80.
- Using the information given, compute the cost of goods transferred to the Finished Goods Inventory account, the cost remaining in the Work in Process Inventory account, and the total costs to be accounted for. Use the FIFO costing method.

- LO 7 Measuring Performance with Nonfinancial Product Data**
- E 15.** During the month of December, Shamai Products Company conducted a study of the productivity of its three-machine metal-trimming center. The data were condensed into product units per hour so that managers could analyze the productivity of individual machine operators. The target output established for the year was 125 units per hour. From the data presented below, analyze the productivity of the three machine operators.

Week	Operator 1	Operator 2	Operator 3
1	119 per hour	129 per hour	124 per hour
2	120 per hour	127 per hour	124 per hour
3	122 per hour	125 per hour	123 per hour
4	124 per hour	122 per hour	124 per hour

PROBLEMS

LO 3 T Account Analysis with Unknowns



- P 1.** Tyler Enterprises makes an assortment of computer support equipment. Dana Josephs, the new controller for the organization, can find only partial information from the past two months, which is presented below.

Account/Transaction	May	June
Materials Inventory, Beginning	\$ 36,240	\$ e
Work in Process Inventory, Beginning	56,480	f
Finished Goods Inventory, Beginning	44,260	g
Materials Purchased	a	96,120
Direct Materials Requested	82,320	h
Direct Labor Costs	b	72,250
Manufacturing Overhead Applied	53,200	i
Cost of Units Completed	c	221,400
Cost of Units Sold	209,050	j
Materials Inventory, Ending	38,910	41,950
Work in Process Inventory, Ending	d	k
Finished Goods Inventory, Ending	47,940	51,180

The current year's predetermined overhead rate is 80 percent of direct labor cost.

REQUIRED

Using the data provided and T accounts, compute the unknown values.

LO 3 Job Order Costing:
LO 4 T Account Analysis

- P 2.** Ricardo Industries, Inc., the finest name in parking attendant apparel, has been in business for over 30 years. Its colorful and stylish uniforms are special-ordered by exclusive hotels and country clubs all over the world. During September, Ricardo completed the following transactions.

- Sept. 1 Direct materials costing \$59,400 were purchased on account.
 3 Direct materials costing \$26,850 were requested for production (all were used on Job A).
 4 Indirect materials were purchased for cash, \$22,830.
 8 The company issued checks for the following manufacturing overhead costs: utilities, \$4,310; manufacturing insurance, \$1,925; and repairs, \$4,640.
 10 Direct materials costing \$29,510 (all used on Job A) and indirect materials costing \$6,480 were requested for production.
 15 Payroll was recorded for the employees. Gross wages and salaries were as follows: direct labor, \$62,900 (all for Job A); indirect labor, \$31,610; manufacturing supervision, \$26,900; and sales commissions, \$32,980.
 15 Overhead was applied to production.
 22 Manufacturing overhead costs were paid: utilities, \$4,270; maintenance, \$3,380; and rent, \$3,250.
 23 The Receiving Department recorded the purchase on account and receipt of \$31,940 of direct materials and \$9,260 of indirect materials.
 27 Production requested \$28,870 of direct materials (Job A, \$2,660; Job B, \$8,400; Job C, \$17,810), and \$7,640 of indirect materials.
 30 The following gross wages and salaries were recorded for employees: direct labor, \$64,220 (Job A, \$44,000; Job B, \$9,000; Job C, \$11,220); indirect labor, \$30,290; manufacturing supervision, \$28,520; and sales commissions, \$36,200.
 30 Manufacturing overhead was applied to production.
 30 Jobs A (58,840 units) and B (3,525 units) were completed and transferred to finished goods inventory; the total cost was \$322,400.
 30 Job A was shipped to the customer; the total production cost was \$294,200, and the sales price was \$418,240.
 30 Adjusting entries for the following were recorded: \$2,680 for depreciation, manufacturing equipment; \$1,230 for property taxes, manufacturing, payable at month end.

Manufacturing overhead was applied at a rate of 120 percent of direct labor cost.

REQUIRED

1. Record the entries for all transactions and events in September in T accounts. Use the following T accounts: Cash, Accounts Receivable, Materials Inventory, Work in Process Inventory, Finished Goods Inventory, Accumulated Depreciation—Manufacturing Equipment, Accounts Payable, Property Taxes Payable, Sales, Cost of Goods Sold, Manufacturing Overhead, Factory Payroll, and Selling and Administrative Expense. Use job order cost cards for Job A, Job B, and Job C. Determine the partial account balances. Assume no beginning inventory balances. Assume that when payroll was recorded, entries were made to the Factory Payroll account. (Round your answers to the nearest whole dollar.)
2. Compute the amount of underapplied or overapplied overhead for September and transfer it to the Cost of Goods Sold account.

LO 3 Job Order Cost Flow**LO 4**

- P 3.** Dorinda Hani is the chief financial officer for Toner Industries, a company that makes special-order printers for personal computers. Her records for February revealed the following information.

Beginning inventory balances:

Materials Inventory	\$27,450
Work in Process Inventory	22,900
Finished Goods Inventory	19,200

Direct materials purchased and received:

Feb. 6	\$ 7,200
Feb. 12	8,110
Feb. 24	5,890

Direct labor costs:

Feb. 14	\$13,750
Feb. 28	13,230

Direct materials requested for production:

Feb. 4	\$ 9,080
Feb. 13	5,940
Feb. 25	7,600

Job order cost cards for jobs in process on February 28 had the following totals.

Job No.	Direct Materials	Direct Labor	Manufacturing Overhead
AJ-10	\$3,220	\$1,810	\$2,534
AJ-14	3,880	2,110	2,954
AJ-30	2,980	1,640	2,296
AJ-16	4,690	2,370	3,318

The predetermined manufacturing overhead rate for the month was 140 percent of direct labor cost. Sales for February totaled \$152,400, which represented a 70 percent markup over the cost of production.

REQUIRED

1. Using T accounts for Materials Inventory, Work in Process Inventory, Finished Goods Inventory, Manufacturing Overhead, Accounts Receivable, Factory Payroll, Sales, and Cost of Goods Sold, reconstruct the transactions for February.
2. Compute the cost of units completed during the month.
3. What was the total cost of units sold during February?
4. Determine the ending balances in the inventory accounts.
5. During the first week of March, Jobs AJ-10 and AJ-14 were completed. No additional direct materials costs were incurred, but Job AJ-10 needed \$720 more direct labor, and Job AJ-14 required additional direct labor of \$1,140. Job AJ-10 was 40 units; Job AJ-14, 55 units. Compute the product unit cost for each completed job (round to two decimal places).

LO 6 Process Costing: With Beginning Inventory—FIFO Method



- P 4.** Canned fruits and vegetables are the main products made by Ossossane Foods, Inc. All direct materials are added at the beginning of the Mixing Department's process. When the ingredients have been mixed, they go to the Cooking Department. There the mixture is heated to 100° Celsius and simmered for 20 minutes. When cooled, the mixture goes to the Canning Department for final processing. Throughout the operations, direct labor and manufacturing overhead costs are incurred uniformly. Cost data and other information for the Mixing Department for January 20x8 are as follows:

Production Cost Data	Direct Materials Costs	Conversion Costs
Mixing		
Beginning inventory	\$ 28,560	\$ 5,230
Current period costs	\$450,000	\$181,200
Work in Process Inventory		
Beginning inventory (40% complete)	5,000 liters	
Ending inventory (60% complete)	6,000 liters	
Unit Production Data		
Units started during Jan.	90,000 liters	
Units transferred out during Jan.	89,000 liters	

Assume that no spoilage or evaporation loss took place during January.

REQUIRED

- Using the FIFO costing method, prepare a process cost report for the Mixing Department for January with (a) a schedule of equivalent production, (b) a unit cost analysis schedule, and (c) a cost summary schedule.
- Explain how the analysis for the Cooking Department will differ from the analysis for the Mixing Department.

**LO 5 Process Costing:
LO 6 One Process/Two Time Periods—FIFO Method**



- P 5.** Clean Wash Laboratories produces liquid detergents that leave no soap film. All elements are biodegradable. The production process has been automated, so that the product can now be produced in one operation instead of a series of heating, mixing, and cooling operations. All direct materials are added at the beginning of the process, and conversion costs are incurred uniformly throughout the process. Operating data for July and August 20x3 are as follows:

	July	August
Beginning work in process inventory		
Units (pounds)	2,300	3,050
Direct materials costs	\$ 4,699	*
Conversion costs	\$ 1,219	*
Production during the period		
Units started (pounds)	31,500	32,800
Direct materials costs	\$65,520	\$66,912
Conversion costs	\$54,213	\$54,774
Ending work in process inventory		
Units (pounds)	3,050	3,600

*From calculations at the end of July.

The beginning work in process inventory was 30 percent complete for conversion costs. The points of completion for ending work in process inventories were July, 60 percent, and August, 50 percent. Assume the loss from spoilage and evaporation was negligible.

REQUIRED

- Using the FIFO costing method, prepare a process cost report for July with (a) a schedule of equivalent production, (b) a unit cost analysis schedule, and (c) a cost summary schedule.
- From the information in the cost summary schedule, identify the amount that should be transferred out of the Work in Process Inventory account, and state where those dollars should be transferred.
- Repeat 1 and 2 for August.

ALTERNATE PROBLEMS**LO 3 Job Order Costing:**
LO 4 T Account Analysis

- P 6.** Bogey Carts Manufacturing, Inc., produces electric golf carts. The carts are special-order items, so the company uses a job order costing system. Manufacturing overhead is applied at the rate of 90 percent of direct labor cost. Following is a list of events and transactions for January.

- Jan. 1 Direct materials costing \$215,400 were purchased on account.
 2 Indirect materials were purchased on account, \$49,500.
 4 Production personnel requested direct materials costing \$193,200 (all used on Job X) and indirect materials costing \$38,100.
 10 The following manufacturing overhead costs were paid: utilities, \$4,400; manufacturing rent, \$3,800; and maintenance charges, \$3,900.
 15 Payroll was recorded for employees. Gross wages and salaries were as follows: direct labor, \$120,000 (all for Job X); indirect labor, \$60,620; sales commissions, \$32,400; and administrative salaries, \$38,000.
 15 Manufacturing overhead was applied to production.
 19 Indirect materials costing \$27,550 and direct materials listed at \$190,450 were purchased on account.
 21 Direct materials costing \$214,750 (Job X, \$178,170; Job Y, \$18,170; Job Z, \$18,410) and indirect materials costing \$31,400 were requested for production.
 31 The following gross wages and salaries were recorded: direct labor, \$132,000 (Job X, \$118,500; Job Y, \$7,000; Job Z, \$6,500); indirect labor, \$62,240; sales commissions, \$31,200; and administrative salaries, \$38,000.
 31 Manufacturing overhead was applied to production.
 31 Jobs X (375 carts) and Y (10 carts) were completed and transferred to finished goods inventory; total cost was \$855,990.
 31 Job X was shipped to the customer; the total production cost was \$824,520, and the sales price was \$996,800.
 31 The following manufacturing overhead costs (adjusting entries) were recorded: prepaid insurance expired, \$3,700; property taxes (payable at year end), \$3,400; and depreciation, machinery, \$15,500.

REQUIRED

- Record the entries for all transactions and events in January using the following T accounts: Materials Inventory, Work in Process Inventory, Finished Goods Inventory, Manufacturing Overhead, Cash, Accounts Receivable, Prepaid Insurance, Accumulated Depreciation—Machinery, Accounts Payable, Factory Payroll, Property Taxes Payable, Sales, Cost of Goods Sold, and Selling and Administrative Expense. Use job order cost cards for Job X, Job Y, and Job Z. Determine the partial account balances. Assume no beginning inventory balances. Also assume that when the payroll was recorded, entries were made to the Factory Payroll account.
- Compute the amount of underapplied or overapplied overhead as of January 31 and transfer it to the Cost of Goods Sold account.

LO 3 Job Order Cost Flow
LO 4

- P 7.** The three May 31 inventory balances of Theodora Designs, a manufacturer of high-quality children's clothing, were as follows:

Account	Balance
Materials Inventory	\$21,360
Work in Process Inventory	15,112
Finished Goods Inventory	17,120

Job order cost cards for jobs in process as of June 30 had the following totals:

Job No.	Direct Materials	Direct Labor	Manufacturing Overhead
24-A	\$1,596	\$1,290	\$1,677
24-B	1,492	1,380	1,794
24-C	1,984	1,760	2,288
24-D	1,608	1,540	2,002

Materials purchased and received in June:

June 4	\$33,120
June 16	28,600
June 22	31,920

Direct labor costs for June:

June 15 payroll	\$23,680
June 29 payroll	25,960

Predetermined overhead rate:

130 percent of direct labor cost

Direct materials requested for production during June:

June 6	\$37,240
June 23	38,960

Finished goods with a 75 percent markup over cost were sold during June for \$320,000.

REQUIRED

1. Use the following T accounts to reconstruct the transactions for June: Materials Inventory, Work in Process Inventory, Finished Goods Inventory, Manufacturing Overhead, Accounts Receivable, Factory Payroll, Sales, and Cost of Goods Sold.
2. Compute the cost of units completed during the month.
3. What was the total cost of units sold during June?
4. Determine the ending inventory balances.
5. Jobs 24-A and 24-C were completed during the first week of July. No additional materials costs were incurred, but Job 24-A required \$960 more direct labor, and Job 24-C needed additional direct labor of \$1,610. Job 24-A was composed of 1,200 pairs of trousers; Job 24-C, of 950 shirts. Compute the product unit cost for each job. (Round your answers to two decimal places.)

LO 6 Process Costing: With Beginning Inventory—FIFO Method



- P 8.** Lenox Bottling Company manufactures and sells several different kinds of soft drinks. Direct materials (sugar syrup and artificial flavor) are added at the beginning of production in the Mixing Department. Direct labor and manufacturing overhead costs are applied to products throughout the process. During August 20x2, beginning inventory for the citrus flavor was 2,400 gallons, 80 percent complete. Ending inventory was 3,600 gallons, 50 percent complete. Production data showed 240,000 gallons started during August. A total of 238,800 gallons was completed and transferred to the Bottling Department. Beginning inventory costs were \$600 for direct materials and \$676 for conversion costs. Current period costs were \$57,600 for direct materials and \$83,538 for conversion costs.

REQUIRED

1. Using the FIFO costing method, prepare a process cost report for the Mixing Department for August with (a) a schedule of equivalent production, (b) a unit cost analysis schedule, and (c) a cost summary schedule.
2. From the information in the cost summary schedule, identify the amount that should be transferred out of the Work in Process Inventory account, and state where those dollars should be transferred.

EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

LO 1 Business Plans

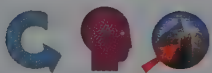


SD 1. In the past 20 years, *Fortune* 500 companies have eliminated over 5 million jobs, yet the overall U.S. economy has grown by almost 30 million jobs. Most of the new jobs have been created by new businesses. A key step in starting a new company is a realistic analysis of the people, opportunities, context, risks, and rewards of the venture and the formulation of a business plan. Notice the similarities between the questions managers answer in the management cycle and the nine questions every great business plan should answer:⁴

- Who is the new venture's customer?
- How does the customer make decisions about buying this product or service?
- To what degree is the product or service a compelling purchase for the customer?
- How will the product or service be priced?
- How will the venture reach all the identified customer segments?
- How much does it cost (in time and resources) to acquire a customer?
- How much does it cost to produce and deliver the product or service?
- How much does it cost to support a customer?
- How easy is it to retain a customer?

Assume you are a consultant who has been hired for your knowledge of the management cycle. Write a memo that discusses how the nine questions fit into the management cycle.

LO 1 Role of Cost Information in Software Development



SD 2. Michael Cassidy, the CEO of *Direct Hit Technologies, Inc.*, has a problem: when is "good enough" good enough? As the creator of search technology that makes finding relevant information on the Internet both quick and easy, Cassidy worries about how many developer hours should be devoted to a new product. His industry's rule of thumb is that developing and shipping new software generally takes six to nine months. Direct Hit Technologies, Inc., attempts to develop and ship product much more quickly, so from the industry's viewpoint, the company is successful in meeting the industry's measure of performance.

Another performance measure Cassidy uses to answer his question is a "good enough" calculation based on the economic value (not cost) of what his company's developers create. Taking the estimated current market valuation of his firm and dividing it by the number of product developers in the firm, he arrives at the market value created per developer. Given that his firm has been in existence one year, it is also the value created per developer for a year. By dividing this annual creation value per developer by the number of workdays in the year, Cassidy arrives at an added value a developer creates in one workday of approximately \$10,000. Thus, the company's "good enough" measure focuses on whether a new product's potential justifies an investment of time by someone who is worth \$10,000 per day. The salary cost of the company's developers is not used in the "good enough" calculation. Why is that cost not relevant?⁵



Communication



Critical Thinking



Ethics



Group Activity



Hot Links
to Real Companies



International



Internet



Memo



Spreadsheet

LO 3 Ethical Job Order Costs

- SD 3.** Kevin Rogers, the production manager for *Stitts Metal Products Company*, entered the office of controller Ed Harris and asked, "Ed, what gives here? I was charged for 330 direct labor hours on Job AD22 and my records show that we only spent 290 hours on that job. That 40-hour difference caused the total cost of direct labor and manufacturing overhead for the job to increase by over \$5,500. Are my records wrong, or was there an error in the direct labor assigned to the job?" Harris responded, "Don't worry about it, Kevin. This job won't be used in your quarterly performance evaluation. Job AD22 was a federal government job, a cost-plus contract, so the more costs we assign to it, the more profit we make. We decided to add a few hours to the job in case there is some follow-up work to do. You know how fussy the feds are."

What should Kevin Rogers do? Discuss Ed Harris's costing procedure.

Research Activity**LO 5 Process Costing Systems**

- SD 4.** Locate an article about a company that you believe would use a process costing system. Conduct your search using the business section of your local newspaper, *The Wall Street Journal*, or other business periodicals.

Prepare a short report that describes the product(s) the company makes and its production process, and explains why it probably uses a process costing system. Bring this information to class to share with your classmates. Be sure to include the company's name and identify the article's title, author(s), and publication date.



Group Activity: Group students according to type of production process and ask them to discuss their findings. If time allows, pair students with different production processes and ask them to explain their company to their partner.

Decision-Making Practice**LO 3 Analysis of Job Order****LO 4 Costing Systems**

- SD 5.** *Zavala Manufacturing Company* is a small family-owned business that makes specialty plastic products. Since it was started three years ago, the company has grown quickly and now employs ten production people. Because of the nature of its products, the company uses a job order costing system. The company's manual accounting system is falling behind in processing transactions.

Two months ago, in May, the company's accountant quit. You have been called in to help management. The following information has been given to you.

Beginning inventory balances (December 31):

Materials Inventory	\$50,420
Work in Process Inventory (Job K-2)	59,100
Finished Goods Inventory (Job K-1)	76,480

Direct materials requested for production during the year:

Job K-2	\$33,850
Job K-4	53,380
Job K-5	82,400

Direct labor for the year:

Job K-2	\$25,300
Job K-4	33,480
Job K-5	45,600

The company purchased materials only once (in February), for \$126,500. All jobs use the same materials. For the current year, the company has been using a manufacturing overhead application rate of 150 percent of direct labor costs. So far, two jobs, K-2 and K-4, have been completed, and Jobs K-1 and K-2 have been shipped to customers. Job K-1 contained 3,200 units; Job K-2, 5,500 units; and Job K-4, 4,600 units. The beginning Work in Process Inventory balance for Job K-2 consisted of \$16,975 of direct materials, \$16,850 of direct labor, and \$25,275 of manufacturing overhead.

1. Calculate the product unit costs for Jobs K-1, K-2, and K-4, and the costs so far for Job K-5.

- From the information given, prepare job order cost cards for Jobs K-2, K-4, and K-5, and compute the current balances in the Materials Inventory, Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold accounts.
- The president has asked you to analyze the current job order costing system. Do you think the system should be changed? How? Why? Prepare an outline of your response to the president.

MANAGERIAL REPORTING AND ANALYSIS

Interpreting Management Reports

LO 1 Interpreting Nonfinancial Data



MRA 1.

Eagle Manufacturing supplies engine parts to **Cherokee Cycle Company**, a major U.S. manufacturer of motorcycles. Eagle, like all parts suppliers for Cherokee, has always added a healthy profit margin to its cost when calculating its selling price to Cherokee. Recently, however, several new suppliers have offered to provide parts to Cherokee for lower prices than Eagle has been charging.

Because Eagle wants to keep Cherokee's business, a team of managers analyzed the company's product costs and decided to make minor changes in the company's manufacturing process. No new equipment was purchased, and no additional labor was required. Instead, the machines were rearranged and some of the work was reassigned.

To monitor the effectiveness of the changes, Eagle introduced three new performance measures to its information system: inventory levels, lead time (total time required for a part to move through the production process), and productivity (number of parts manufactured per person per day). Eagle's goal was to reduce the quantities of the first two performance measures and to increase the quantity of the third.

A section of a recent management report, shown below, summarizes the quantities for each performance measure before and after the changes in the manufacturing process were made.

Measure	Before	After	Improvement
Inventory in dollars	\$21,444	\$10,772	50%
Lead time in minutes	17	11	35%
Productivity (parts per person per day)	515	1,152	124%

REQUIRED

- Do you believe Eagle improved the quality of its manufacturing process and the quality of its engine parts? Explain your answer.
- Can Eagle lower its selling price to Cherokee? Explain your answer.
- Was the design of the product costing system affected by the introduction of the new measures? Explain your answer.
- Do you believe that the new measures caused a change in Eagle's cost per engine part? In what way?

Formulating Management Reports

LO 1 Product Costing Systems and Nonfinancial Data



MRA 2.

Refer to the information in MRA 1. Jordan Smith, the president of **Eagle Manufacturing**, wants to improve the quality of the company's operations and products. She believes waste exists in the design and manufacture of standard engine parts. To begin the improvement process, she has asked you (1) to identify sources of waste, (2) to develop performance measures to account for the waste, and (3) to estimate the current costs associated with such waste. She has asked you to write a memo presenting your findings within two weeks so that she can begin strategic planning to revise the selling price for engine parts to Cherokee.

You have identified two sources of costly waste. The Production Department is redoing work that was not done correctly the first time, and the Engineering Design Department is redesigning products that were not designed according to customer specifications the first time. Having improper designs has caused the company to buy parts that are not used in production. You have also obtained the following information from the product costing system:

Direct labor costs	\$673,402
Engineering design costs	124,709
Indirect labor costs	67,200
Depreciation on production equipment	84,300
Supervisors' salaries	98,340
Direct materials costs	432,223
Indirect materials costs	44,332

REQUIRED

- In preparation for writing your memo, answer the following questions.
 - For whom are you preparing the memo? What is the appropriate length of the memo?
 - Why are you preparing the memo?
 - What information is needed for the memo? Where can you get such information? What performance measure would you suggest for each activity? Is the accounting information sufficient for your memo?
 - When is the memo due? What can be done in order to provide accurate and timely information?
- Prepare an outline of the sections you would want in your memo.

International Company**MRA 3.**

The *Al Khali Corporation*'s copper mines hold 63 percent of the 23.2 million tons of copper in Saudi Arabia. The owners of the mining operation are willing to invest millions of dollars in the latest pyrometallurgical copper extraction processes. The production managers are currently examining both batch and continuous methods of applying the new copper extraction process. The method they choose will replace the hydrometallurgical process now in use.

What effect will the method selected by the production managers have on the design of the product costing system? What effect would changing from hydrometallurgical to pyrometallurgical processing have on the design of the product costing system if both processes use continuous methods of extraction?

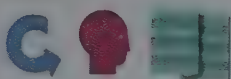
Excel Spreadsheet Analysis**MRA 4.**

Seader Corporation produces a line of home products in its Fargo, North Dakota, plant. The Shaping Department has been making two-gallon chili pots for the past three months. The production process has been automated, so the product can now be produced in one operation rather than in the three operations that were needed before the automated machinery was purchased. All direct materials are added at the beginning of the process, and conversion costs are incurred uniformly throughout the process. Operating data for May and June 20x5 were as follows:

	May	June
Beginning Work in Process Inventory		
Units (May: 40% complete)	220	?
Direct materials costs	\$ 400	\$ 360
Conversion costs	\$ 125	\$ 134
Production during the month		
Units started	24,000	31,000
Direct materials costs	\$35,000	\$74,400
Conversion costs	\$26,000	\$29,695
Ending Work in Process Inventory		
Units (May: 70% complete; June: 60% complete)	200	320
Unit costs		
Direct materials costs	\$ 1.80	\$?
Conversion costs	.96	?
Product unit cost	<u>\$ 2.76</u>	<u>\$?</u>

REQUIRED

- Prepare a process cost report for June 20x5, including (a) a schedule of equivalent units, (b) a unit cost analysis schedule, and (c) a cost summary schedule. (Round unit costs to two decimal places; round all other dollar amounts to the nearest dollar.)

LO 1 Design of a Product**LO 2 Costing System****LO 5****LO 6 FIFO Process Costing:****LO 7 One Process—Two Time Periods**

2. From the information in the cost summary schedule, identify the amount that should be transferred out of the Work in Process Inventory account, and state where those dollars should be transferred.
3. Compare the product costing results of the Shaping Department for the current month with those for the previous month. What is the most significant change? What are some possible causes of this change?

Internet Case

MBA 5.

LO 1 Interpreting Web Sites



Refer to the opening Decision Point in this chapter about the custom suit manufacturer John H. Daniel Company. Do a key word search for other clothing manufacturers. Select two companies that make similar clothes and access their web sites. Conduct an Internet shopping audit similar to the one P. Kelly Mooney does as the intelligence director for Resource Marketing, Inc., a technology marketing and communications company based in Columbus, Ohio.

Mooney uses five principles to evaluate Internet shopping sites on aspects such as prepurchase customer service, gift giving, special promotions, and postpurchase follow-through. Mooney describes the five principles as follows:⁶

- **Don't just do it:** The web site is more than the company's catalogue loaded online.
- **Don't let your seams show:** Shopping is designed to seamlessly guide customers according to their needs in every retail environment, both online and in person (if applicable).
- **Own the customer experience:** The web site is easy, intuitive, and accessible because the company is good at asking customers about the types of information they want. As a result, the site becomes personalized to the customer and the kind of service he or she desires.
- **Avoid barriers to entry:** The web site should center on the customer. It should have clear connection paths, quick-loading graphics, well-organized pages, crisp self-help features, and personal e-mail responses that state all details of the shopping transaction in plain language.
- **Trust is a must:** The web site does not follow a one-size-fits-all information-gathering approach. Shortcuts allow customers to browse and learn to trust the company as a valued adviser.

Use Mooney's five principles to answer the following questions about the two companies you chose.

1. Identify the companies, their product lines, and their URLs. Taking a customer's perspective, describe your impressions of their web sites and their custom offerings.
2. Compare the companies' order forms. Do the companies request the same measurements and other information? Are their prices comparable for like items? How do the order forms differ?
3. Assume you are the manager of each company you chose. Did your product unit cost influence your pricing decisions? What other factors had a significant effect on the prices you set?
4. If the companies' financial statements are available on their web sites, review the figures for cost of goods sold and inventories. Describe your findings. Do the financial results agree with your previous impressions?

ENDNOTES

1. Robert L. Simison, "Toyota Finds Way to Make Custom Car in 5 Days," *The Wall Street Journal*, August 6, 1999.
2. Associated Press, "\$75 Screws? The Pentagon Pays It," *The Gainesville Sun*, March 19, 1998.
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Activity-Based Systems: Activity-Based Management and Just-in-Time

LEARNING OBJECTIVES

- 1 Explain the role of activity-based systems in the management cycle.
- 2 Define *activity-based management (ABM)* and discuss its relationship with the supply network and the value chain.
- 3 Distinguish between value-adding and nonvalue-adding activities, and describe process value analysis.
- 4 Define *activity-based costing*, and explain how a cost hierarchy and a bill of activities are used.
- 5 Define the *just-in-time (JIT) operating philosophy* and identify the elements of a JIT operating environment.
- 6 Identify the changes in product costing that result when a firm adopts a JIT operating environment.
- 7 Define and apply *backflush costing*, and compare the cost flows in traditional and backflush costing.
- 8 Compare ABM and JIT as activity-based systems.



DECISION POINT: A MANAGER'S FOCUS



United Parcel Service and eLogistics.net

United Parcel Service knows that a critical part of its future success will come from taking advantage of the Internet to provide a variety of distribution and logistics services. As the largest package distributor in the world in both volume and revenue, UPS wants to move from the low-margin business of delivering boxes into the more lucrative business of purveying information over the Web. As part of this repositioning effort for ecommerce, UPS established a separate company, eLogistics.net, to create efficient supply networks for its customers by centralizing their online information and logistics needs. eLogistics.net seeks to become the premier global nerve center where vendors, manufacturers, dealers, and other customers can track product progress at every stage of production and distribution. For example, not only could a manufacturer waiting for a shipment of materials for a particular project check where the materials were and when they would arrive, but so could other affected vendors, dealers, and customers.¹ How can activity-based systems help eLogistics.net managers compete globally?

The managers at eLogistics.net can use activity-based systems to better determine the costs of their company's services and to identify and reduce or eliminate business activities that do not add value for the company's customers. eLogistics.net will also provide quantitative activity-based information to its customers so that their managers can use activity-based systems to determine the costs of their products or services. Activity-based management (ABM) and the just-in-time (JIT) operating philosophy rely on the examination of activities to minimize waste, reduce costs, and improve the allocation of resources. eLogistics.net and its customers can use ABM plus its tool, activity-based costing (ABC), to improve product and service costing. These systems will help managers make better decisions about pricing, adding or dropping product or service lines, changing production or distribution processes, and contracting with other companies to provide products or services. The information provided by eLogistics.net will help customers using JIT to improve their production processes, manage their inventory levels, and schedule timely production.

UPS and eLogistics.net realize business is changing rapidly. To meet the varied needs of their users, supply networks must provide universal access to information in real time. ABM and JIT allow the managers of eLogistics.net to define new, customizable ways to process and view business.

Activity-Based Systems and Management

OBJECTIVE

1 Explain the role of activity-based systems in the management cycle



Many companies operate in volatile business environments that are strongly influenced by customer demands. Company managers know that customers buy value, usually in the form of quality products or services that are delivered on a timely basis for a reasonable price. Companies generate revenue when customers see value and buy their product or service. Thus, companies measure value as the revenue generated by the company (customer value = revenue generated).

Value exists when some characteristic of a product or service satisfies customers' wants or needs. For example, Dell Computer Corporation knows that one market segment is customers who appreciate convenience. In response to their needs, Dell creates value and increases revenue by selling computer systems called Dell Dimension Systems. They include the latest microprocessor, monitor, graphics card, CD-ROM or DVD drive, sound card, modem, speakers, and preinstalled Microsoft software products. Microsoft creates value and increases revenue by offering its customers "free" upgrades of selected software on the Internet.

To create value and to satisfy customer needs for quality, reasonable price, and timely delivery, managers must

- Work with suppliers and customers
- View the organization as a collection of value-adding activities
- Use resources for value-adding activities
- Reduce or eliminate nonvalue-adding activities
- Know the total cost of creating value for a customer

If an organization's strategic plan focuses on providing products or services that customers esteem, then managers will work with suppliers and customers to find ways to collectively improve quality, reduce costs, and improve delivery time. Managers will also focus their attention internally to find the best ways of using resources to create or maintain value in their products or services. This requires matching the resources to operating activities that add value to a product or service. Managers will examine all business activities, including research and development, purchasing, production, storing, selling, shipping, and customer service, so that they can successfully allocate resources. In addition, managers need to know the **full product cost**, which includes not only the costs of direct materials and direct labor, but also the costs of all production and nonproduction activities required to satisfy the customer. For example, the full product cost of a Dell Dimension System includes not only the cost of the computer components and software, but also the costs of taking the sales order, processing the order, packaging and shipping the system, and providing subsequent customer service for warranty work and software upgrades. If the activities are executed well and in agreement with the strategic plan, and if costs are assigned fairly, the company can improve product pricing and product quality, increase productivity, and generate revenues (value) and profits.

Activity-Based Systems

Organizations that focus on customers redesign their accounting information systems to provide customer-related, activity-based information. **Activity-based systems** are information systems that provide quantitative information about the activities in an organization. They create opportunities to improve the cost information supplied to managers. They also help managers view their organization as a collection of activities. Activity-based cost information helps managers improve operating processes and make better pricing decisions.

Activity-based systems developed because traditional accounting systems failed to produce the types of information today's business managers need for decision making. Traditional systems focused primarily on measurements needed for financial reporting and auditing, such as the measurement of cost of goods sold and the valuation of inventory. Traditional systems were not designed to capture data on activities or to trace the full cost of a product. Traditional practices did not isolate the cost of unnecessary activities, penalize for overproduction, or quantify measures that improved quality or reduced throughput time.

In this chapter, we will look at two types of activity-based systems—activity-based management (ABM) and just-in-time (JIT)—and consider the changes made to product costing systems when either of these systems is used. Both systems help organizations manage activities, not costs. By managing activities, organizations can reduce or eliminate many nonvalue-adding activities, which leads to reduced costs and increased income.

Using Activity-Based Systems in the Management Cycle

When organizations operate in more volatile business environments, their managers must plan, execute, evaluate, and report differently. In this chapter, we expand our view of the management cycle to consider an organization as a collection of activities. As mentioned earlier, managers depend on relevant and reliable financial and nonfinancial information to manage the organization. One function of the management accountant is to develop an accounting information system that supplies easy-to-understand information about product costs to answer the basic questions that arise at each stage in the management cycle.

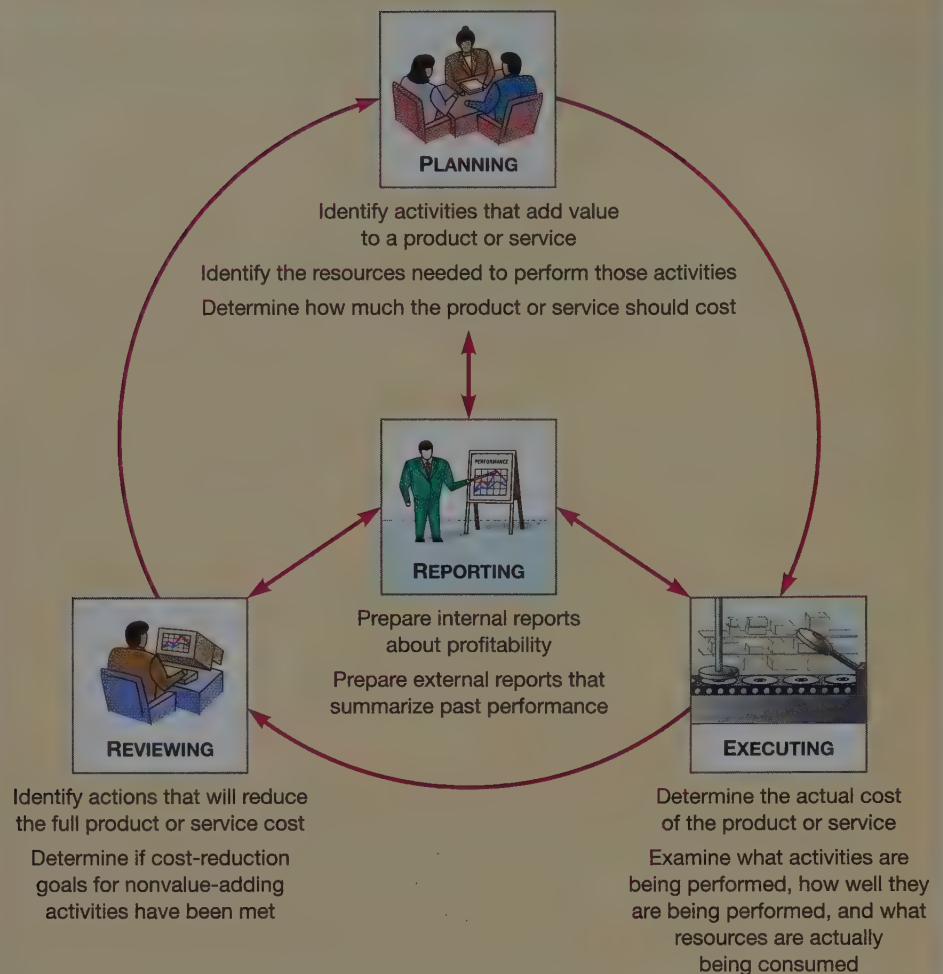


Figure 1 summarizes how managers use activity-based cost information during the management cycle. Let's use eLogistics.net as an example.

PLANNING In the planning stage, managers want answers to questions like "Which activities add value to a product or service?" "What resources are needed to perform those activities?" and "How much should the product or service cost?" We know that eLogistics.net wants to increase its sales in ecommerce. By examining eLogistics.net's value-adding activities and their related costs, management can ensure that the company is offering quality services at the lowest cost. If budgeted cost information is prepared for each activity, management can better allocate resources to cost objects (for example, service lines, customer groups, or sales territories) and measure operating performance. If managers assume that resource-consuming activities cause costs and that services incur costs by the activities they require, the estimated service unit cost will be more accurate.

EXECUTING In the executing stage, managers want an answer to the question "What is the actual cost of making our product or providing our service?" They want to know what activities are being performed, how well the activities are being performed, and what resources are actually being consumed. The managers

Figure 1
Activity-Based Systems and the
Management Cycle



at eLogistics.net will focus on the activities that add the most value to the services that customers buy. However, these managers will also monitor some nonvalue-adding activities that have been reduced but that have not been completely eliminated. The accounting information system measures actual quantities of activity (a nonfinancial quantitative measure) and accumulates related activity costs (a financial quantitative measure). Gathering quantitative information at the activity level allows eLogistics.net's managers the flexibility to create cost pools for different types of cost objects. For example, the costs of the selling activity can be assigned to a customer (Wal-Mart), to a sales territory (Asia), or to a service line (small package delivery).

REVIEWING In the reviewing stage, managers want answers to the questions "What actions will reduce the full product and service cost?" and "Did we meet our cost-reduction goals for nonvalue-adding activities?" Managers can measure an activity's performance by reviewing the difference between its actual and budgeted costs. With this information, they can analyze the variances in activity levels, identify waste and inefficiencies, and take action to improve processes and activities. They can also continue to monitor the costs of nonvalue-adding activities to see if the company met its goals of reducing or eliminating those costs. Careful review

FOCUS ON BUSINESS PRACTICE

Many companies are finding that activity-based costing (ABC) enhances management reporting and decision making because it reflects the cause-and-effect relationships between indirect costs and individual processes, products, services, or customers. ABC is not a replacement for traditional general ledger accounting, which collects costs by departments. Rather, it is a practical spreadsheet translation of general ledger data into a format aimed at estimating true cost. The table on the right compares the reports of a department in a health-related company. Identify the report that would be used for financial purposes and the one that would be used for decision making.²

Chart of Accounts View		Activity-Based Costing View	
Salaries	\$621,400	Key/scan claims	\$ 32,000
Equipment	161,200	Analyze claims	121,000
Travel		Suspend claims	32,500
expenses	58,000	Receive provider	
Supplies	43,900	inquiries	101,500
Use and		Resolve member	
occupancy	30,000	problems	83,400
		Process batches	45,000
		Determine	
		eligibility	119,000
		Make copies	145,000
		Write	
		correspondence	77,100
		Attend training	158,000
Total	<u>\$914,500</u>	Total	<u>\$914,500</u>

and analysis will lead to increased customer value by improving quality and reducing costs and cycle time.



REPORTING Finally, in the reporting stage of the management cycle, managers communicate with internal and external users about the company. Internally, UPS and eLogistics.net managers will want to see reports that show the application of the costs of activities to cost objects. This better measures profitability, as will be shown with bills of activities later in the chapter. External financial reports summarize past performance and answer such questions as “Did the company earn a profit?”

Activity-Based Management and Activity-Based Costing

OBJECTIVE

2 Define *activity-based management (ABM)* and discuss its relationship with the supply network and the value chain

As defined in an earlier chapter, **activity-based management (ABM)** is an approach to managing an organization that identifies all major operating activities. It determines what resources are consumed by each activity, identifies how resources are consumed by each activity, and categorizes the activities as either adding value to a product or service or not adding value. ABM focuses on the reduction or elimination of nonvalue-adding activities. It is beneficial for both strategic planning and operational decision-making because it provides financial and operational performance information at the activity level. This is useful for making decisions about business segments, such as product lines, market segments, and customer groups. It also helps managers eliminate waste and inefficiencies and redirect resources to activities that add value to the product or service. Activity-based costing (ABC) is the tool used in an ABM environment to assist in assigning activity costs to cost objects for product costing and decision making. ABC helps managers make better pricing decisions, inventory valuations, and profitability decisions.

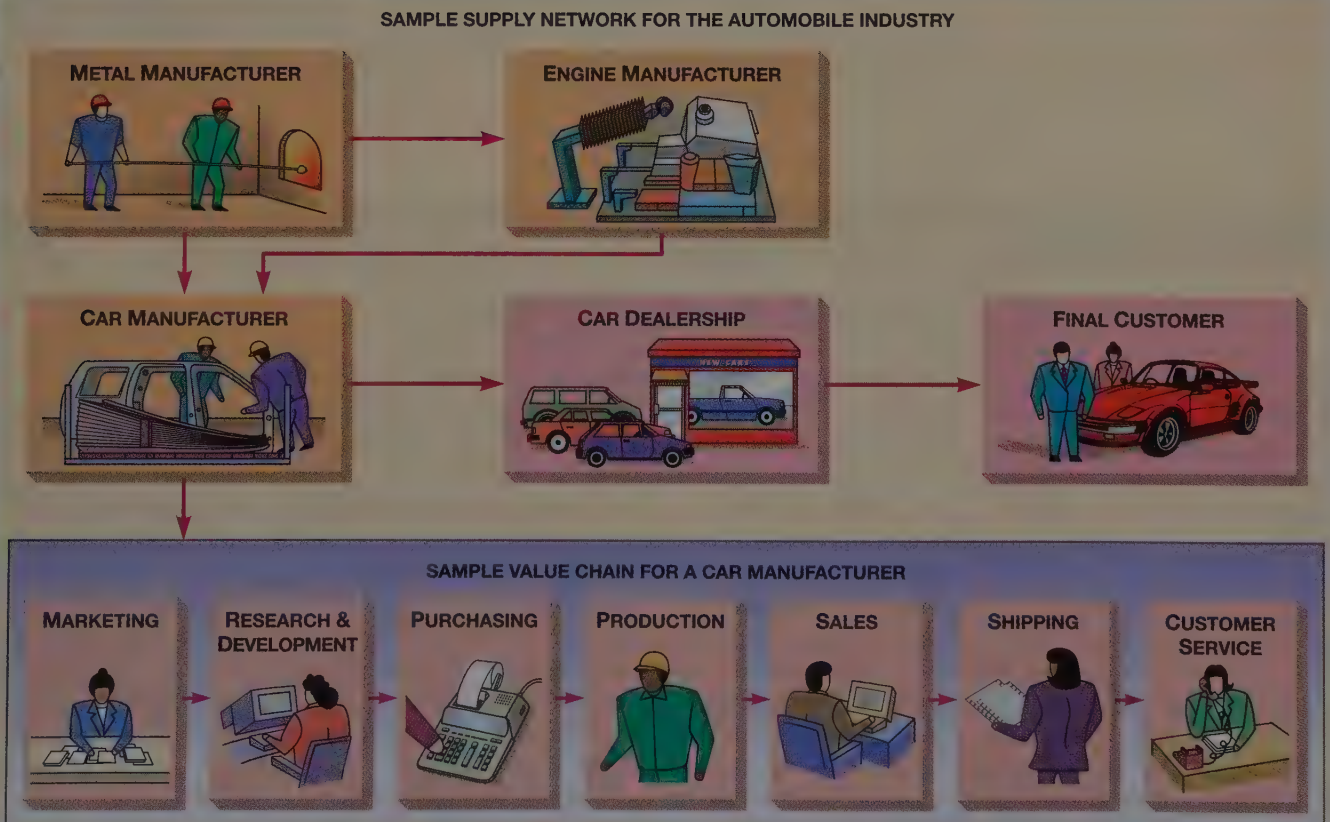
Supply Networks and Value Chains

Two tools of ABM, supply networks and value chains, help managers better understand their organization's external and internal operations. A **supply network** is an interdependent web of organizations that supply materials, products, or services to a customer. When managers understand their product's or service's supply network, they can better understand their organization's role in the total process of creating its product or service and delivering it to customers. Every organization can create a variety of supply networks because of its variety of suppliers and customers.


As shown in Figure 2, a supply network includes both suppliers and suppliers' suppliers, and customers and customers' customers. The network flows from materials through production, distribution, and retailing to the final customer. For example, in the automobile industry, a metal manufacturer supplies metal to an engine manufacturer, who supplies engines to the car manufacturer. The car manufacturer supplies cars to car dealerships, who supply cars to the final customers. Except for the metal manufacturer, each organization in the supply network is a customer of a supplier earlier in the network. Each organization in the supply network has its own value-creating activities. You may remember from the opening Decision Point for this chapter that UPS and its subsidiary, eLogistics.net, want to be the online information link for supply networks.

A **value chain** is a related sequence of value-creating activities within an organization. It helps managers better understand the interdependencies of those activities. The sequence of value-creating activities varies from company to company depending on a number of factors, including the size of the company and the types of products or services sold. For example, Figure 2 shows the value chain of activ-

Figure 2
Supply Network and Value Chain
for a Manufacturing Company




FOCUS ON BUSINESS ETHICS

 Harley-Davidson's value chain is incorporated into its organizational chart. The chart consists of three overlapping circles—a Create Demand Circle, a Produce Products Circle, and a Support Circle; in the center, where the three circles overlap, is the Leadership and Strategy Council. The three circles represent self-directed work teams of eight or nine senior managers. The Create Demand Circle focuses on sales and mar-


keting issues. The Produce Products Circle is responsible for engineering and manufacturing. The Support Circle handles legal, financial, human resource, and communication concerns. The Leadership and Strategy Council coordinates issues that involve all the circles—strategic plans, operating budgets, and policies affecting all employees. The council consists of the chief operating officer and six managers elected by their circle peers. Because it is made up of interconnected circles, Harley's organizational chart emphasizes the interdependence and collaboration necessary for value chain success. It also reinforces the company's ethical code of valuing both individuals and teamwork.³

ities for a car manufacturer. Such a value chain is commonly found within manufacturing companies. The value chain includes activities for marketing, research and development, purchasing, production, sales, shipping, and customer service (installation, maintenance, replacement, handling complaints, billing, and collection). A company's value chain is part of its supply network. That supply network also includes the value chains of the company's suppliers and customers.

 A company can enhance its profitability by understanding not only its own value chain, but also how its value-adding activities fit into its suppliers' and customers' value chains. Working with suppliers and customers across the entire supply network provides opportunities to reduce the total cost of making a product, even though costs for one activity may be increased. For example, assume that Ford Motor Co. decided to place order entry computers in its car dealerships. The new computers would streamline the entry and processing of orders, plus make the orders more accurate. In this case, even though Ford would incur the cost of the computers, the total cost of making and delivering a car would decrease because the cost of placing and processing an order would decrease. When organizations work cooperatively with others in their supply network, new processes can be introduced that will reduce the total costs of products or services.

ABM in a Service Organization

Let's look at how ABM can be implemented in a service organization. Western Data Services, Inc. (WDSI) offers strategic data-base marketing to help organizations increase sales. WDSI's basic package of services includes the design of a mail piece (either a Classic Letter with or without inserts or a Self-Mailer), creation and maintenance of marketing data bases containing information about the client's target group, and a production process that prints a promotional piece and prepares it for mailing. WDSI's primary customers tend to be financial institutions throughout the western states, but the company also serves small businesses and nonprofit organizations.

 Carl Marcus, the owner and manager of WDSI, reviewed his company's supply network as part of his strategic plan. As shown in Figure 3, WDSI's supply network includes one supplier, WDSI as a service provider, one customer group (financial institutions), and the customer group's customers. In reality, WDSI has a number of suppliers, including office supply companies, printers, and computer stores. However, Marcus chose to include only WDSI's most significant supplier, Pitney Bowes, because of the significant expense involved in using Pitney Bowes's

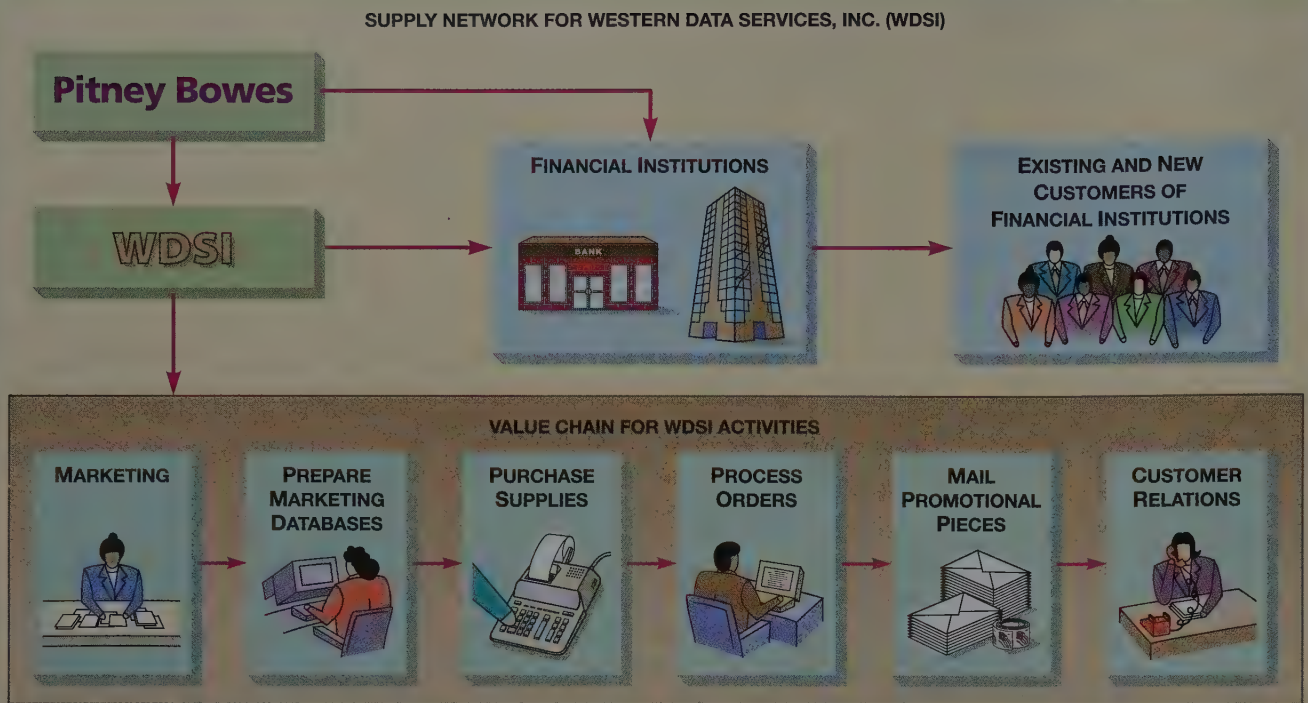


Figure 3
Supply Network and Value
Chain for a Service Organization

equipment to fold, insert, address, seal, and meter mail pieces. Marcus chose financial institutions as the primary customer group in the supply network because they represented 75 percent of his revenues. The customers of the financial institutions are included in the supply network because those individuals and businesses receive the mail pieces prepared by WDSI. Based on his understanding of the supply network, Marcus has changed WDSI's strategy to work with Pitney Bowes and the financial institutions to improve WDSI's services.

Another part of Carl Marcus's strategy is to manage processes and activities using ABM and ABC. Marcus developed a value chain of activities for the company so that he could identify all major operating activities, the resources each activity consumes, and the cause for the resource usage. As shown in Figure 3, WDSI's value chain includes marketing, preparing marketing data bases, purchasing supplies, processing orders, mailing promotional pieces, and customer relations.

Value-Adding and Nonvalue-Adding Activities and Process Value Analysis

OBJECTIVE

3 Distinguish between value-adding and nonvalue-adding activities, and describe process value analysis

An important element of activity-based management is the identification of value-adding and nonvalue-adding activities. A **value-adding activity** is an activity that adds value to a product or service as perceived by the customer. Examples include preparing the engineering design of a new car, assembling the car, painting the car, and installing seats and airbags. A **nonvalue-adding activity** is an activity that adds cost to a product or service but does not increase its market value. Examples include the repair of machines, shop floor clean-up, moving materials, and building maintenance. All of those activities require time and use resources but add no value for the customer. The costs of both types of activities are accumulated to measure performance and to determine if the goal of reducing nonvalue-adding activities has been achieved.

Process value analysis (PVA) is an analytical method of identifying all activities and relating them to the events that cause or drive the need for the activities and the resources consumed. It helps companies using ABM to manage activities. PVA forces managers to look critically at all existing phases of their operations. When nonvalue-adding activities and costs are reduced and cost traceability is improved, product costs become significantly more accurate. This in turn improves management decisions and increases profitability.

Customers value a quality product delivered on a timely basis for a reasonable price. To minimize costs, company managers continuously seek to improve processes and activities. To manage the cost of an activity, a manager can reduce the activity's frequency or eliminate it. For example, inspection costs can be reduced if an inspector samples one of every three engines received from a supplier rather than inspecting every engine. If the supplier is a reliable source of high-quality engines, such a reduction in inspection activity is appropriate. Another way to reduce cost is to contract to have an activity performed by an external party, also called *outsourcing*. Companies are outsourcing purchasing, accounting, and information systems maintenance to companies that either have more expertise or can perform the work at a lower cost.

Other activities can be eliminated completely if business processes are changed. For example, some accounting recordkeeping activities can be eliminated if a company purchases materials just in time for production and makes the product just in time for customer delivery. This change to a just-in-time operating philosophy eliminates the need to accumulate costs as the product is made.

By identifying nonvalue-adding activities, companies can reduce costs and redirect resources to value-adding activities. For example, PVA has enabled companies such as Westinghouse Electric, Pepsi-Cola North America, and Land O'Lakes, Inc., to significantly reduce the costs of managing small-dollar purchases. Managers reviewed and analyzed the activities of purchasing supplies, recording and paying small bills, setting up accounts, and establishing credit with seldom-used suppliers. Once managers identified the nonvalue-adding activities, they were able to determine their costs. Management's response was to stop performing those activities internally. Instead, they chose the less expensive alternative of using a special credit card known as a procurement card (or purchasing card) with Visa, MasterCard, or American Express to handle large volumes of small-dollar purchases.



Value-Adding and Nonvalue-Adding Activities in a Service Organization

Let's look at the value-adding and nonvalue-adding activities in a service organization by continuing with our illustration. Carl Marcus, the owner and manager of WDSI, a strategic data-base marketing company, has examined the activities related to the design, processing, and mailing of Classic Letters. Table 1 shows the value-adding activities for Classic Letters and how those activities add value. When Marcus's customers ask for data-base marketing services, these are the activities they pay for. Marcus also identified a number of nonvalue-adding activities, which include the following:

- Prepare a job order form and schedule the job
- Order, receive, inspect, and store paper, envelopes, and supplies
- Set up machines to process a specific letter size
- Log the total number of items processed in a batch
- Bill the client, plus record and deposit payments from the client

After reviewing the list of nonvalue-adding activities, Marcus arranged with his suppliers to have paper, envelopes, and other supplies delivered the day a job was

Table 1. Value-Adding Activities for a Service Organization

Western Data Services, Inc. Value-Adding Activities for the Classic Letter	
Value-Adding Activities	How the Activity Adds Value
Design the letter	Enhances the effectiveness of the communication
Create a data base of customer names and addresses sorted in ZIP code order	Increases the probability that the client will efficiently and effectively reach the targeted customer group
Verify the conformity of mailing information with USPS requirements	Ensures that the client's mailing will receive the best postal rate
Process the job: A computer prints a personalized letter. A machine folds the letter, inserts it and other information into an envelope, prints the address on the envelope, and seals and meters the envelope.	Creates the client mailing
Deliver the letters to the post office	Begins the delivery process

performed. This helped reduce WDSI's storage costs. Marcus was also able to reduce the costs of some value-adding activities. The cost of verifying the conformity of mailing information with United States Postal Service (USPS) requirements was reduced by purchasing computer software that verifies addresses, determines postage, and helps WDSI's employees select a sorting scheme that eliminates sorting by hand. Now Marcus is ready to determine the unit costs for the Classic Letter service and the Self-Mailer service.

Implementing Activity-Based Costing

OBJECTIVE
4 Define *activity-based costing*, and explain how a cost hierarchy and a bill of activities are used

The issue of how to assign costs fairly to products or services to determine their unit cost has been refined by management accountants as ready access to value chain data has improved. For example, in an earlier chapter you learned about manufacturing overhead rates and the more recent refinement of those rates into activity cost rates. You may recall that traditional overhead allocation methods used cost drivers such as direct labor hours, direct labor costs, or machine hours to assign manufacturing overhead costs to products. However, in the mid-1980s, organizations realized that their product costing systems did not accurately assign manufacturing overhead costs to the product lines. This leads to inaccurate product unit costs and poor pricing decisions. In response, organizations began to critically evaluate their operating processes. They overhauled their product costing systems to more accurately identify the costs of their products or services.

In the search for more accurate product costing, many organizations embraced activity-based costing (ABC). **Activity-based costing** is a method of assigning costs that calculates a more accurate product cost by identifying all of an organiza-

FOCUS ON BUSINESS TECHNOLOGY

Digital postage has become a reality. The digital stamp, a blotchy encrypted image, is produced by a customer—using his or her own computer and printer—who has set up an online account with an authorized U.S. Postal Service vendor. Each digital stamp is unique because it is encoded with information about the sender and the recipient. Postal officials, after years of testing for fraud and counterfeiting, now believe the necessary security systems are in place. They are authorizing companies to sell digital postage nationally.⁴

tion's major operating activities. It traces the indirect costs to those activities and assigns activity costs to products using a cost driver that is related to the cause of the cost. Since its introduction as a viable cost allocation technique, organizations in the United States and throughout the world have adopted ABC.

Activity-based costing is important to activity-based management because it improves the allocation of activity-driven costs to cost objects. To implement activity-based costing, managers

1. Identify and classify each activity
2. Estimate the cost of resources for each activity
3. Identify a cost driver for each activity and estimate the quantity of each cost driver
4. Calculate an activity cost rate
5. Assign costs to cost objects based on the level of activity required to make the product or provide the service

Two tools help in the implementation of ABC—a cost hierarchy and a bill of activities.

THE COST HIERARCHY A **cost hierarchy** is a framework for classifying activities according to the level at which their costs are incurred. Many companies use this framework to manage the allocation of activity-based costs to products or services. In a manufacturing company, the cost hierarchy typically has four levels: the unit level, the batch level, the product level, and the facility level.

- **Unit-level activities** are performed each time a unit is produced. For example, in the engine-installation process for a car manufacturer, unit-level activities include assembling engine subassemblies and connecting engines to car frames. These activities vary with the number of cars produced.
- **Batch-level activities** are performed each time a batch of goods is produced. These activities vary with the number of batches prepared. Examples of batch-level activities in an engine-installation process include setup, inspection, scheduling, and materials handling.
- **Product-level activities** are performed to support the diversity of products in a manufacturing plant. Examples of product-level activities include implementing engineering change notices and redesigning the installation process.
- **Facility-level activities** are performed to support a facility's general manufacturing process. Examples for a car manufacturer include managing, maintaining, lighting, securing, and insuring the manufacturing plant.

Note that the frequency of activities varies across levels and that both value-adding and nonvalue-adding activities are included in the cost hierarchy. Service organizations can also use a cost hierarchy to group activities. The four levels typically are the unit level, the batch level, the service level, and the operations level. Table 2 lists examples of activities in the cost hierarchies for a manufacturing company and a service organization.

THE BILL OF ACTIVITIES Once the cost hierarchy is created, the managers group the activities into the specified levels and prepare a summary of the activity costs assigned to the selected cost objects. A **bill of activities** is a list of activities and related costs that is used to compute the costs assigned to activities and the

Table 2. Sample Activities in Cost Hierarchies

Activity Level	Car Manufacturer: Engine Installation	Direct Mail Service: Preparing a Mailing to Bank Customers
Unit level	Install engine Test engine	Print and fold letter Insert letter and other information into envelope Seal and meter envelope
Batch level	Set up installation process Move engines Inspect engines	Retool machines Verify correct postage Bill client
Product or service level	Redesign installation process	Train employees Develop and maintain computer systems and data bases
Facility or operations level	Provide facility management, maintenance, lighting, security, and space	Provide facility management, maintenance, lighting, security, and space

product unit cost. More complex bills of activities group activities into activity pools and include activity cost rates and cost driver levels used to assign costs to cost objects. A bill of activities may be used as the primary document, or as a supporting schedule, to calculate the product unit cost in job order or process costing. It may also be used in a service organization.

Exhibit 1 illustrates a bill of activities for WDSI. In this example, Carl Marcus uses the bill of activities to see how activity costs contributed to unit costs. WDSI provides two types of services:

- The Classic Letter service involves the printing, folding, collating, and inserting of letters and other materials into a printed, addressed envelope that is then metered and sealed. The cost of the Classic Letter service includes the cost of direct materials (envelopes, letters, other materials), postage, and service overhead.
- The Self-Mailer is a one-page solicitation that can be refolded and returned to the client's address. The cost of the Self-Mailer service includes the costs of direct materials (a single page of paper for each mailer), postage, and service overhead.

The volume of mailings for a customer could vary from 150 to 20,000 addresses in a single mailing. The sizes of the data bases that were prepared and the number of machine setups and inspection hours varied from job to job. The service overhead costs for the activities identified in the cost hierarchy are assigned to the two services using ABC. The activity costs are calculated for the service overhead related to each service. These are then added to the costs of direct materials and postage to calculate a unit cost.

Carl Marcus chose to group activities by unit level, batch level, service level, and operations level.

- At the unit level, Marcus included the costs of all activities needed to process each Classic Letter and Self-Mailer; he used machine hours as the cost driver.
- At the batch level, for each job, Marcus included the costs of all activities required to prepare the data base of names and addresses for mailing, set up the machines, and inspect the letters for compliance with the postal regulations. He selected as the cost drivers the number of names in the data base, direct labor hours, and inspection hours.

Exhibit 1
Bill of Activities for a Service Organization

Western Data Services, Inc.
 Bill of Activities for Classic Letter and Self-Mailer
 For the Month Ended May 31, 20x1

Activity	Activity Cost Rate	Classic Letter (110,000 letters)		Self-Mailer (48,000 self-mailers)	
		Cost Driver Level	Activity Cost	Cost Driver Level	Activity Cost
Unit level					
Process letters	\$20 per machine hour	300 machine hours	\$ 6,000	120 machine hours	\$ 2,400
Batch level					
Prepare data bases	\$85 per 1,000 names	50,000 names	4,250	20,000 names	1,700
Set up machines	\$10 per direct labor hour	220 direct labor hours	2,200	100 direct labor hours	1,000
Inspect for USPS compliance	\$12 per inspection hour	100 inspection hours	1,200	80 inspection hours	960
Service level					
Develop data bases	\$25 per design hour	118 design hours	2,950	81 design hours	2,025
Solicit new customers	\$3 per solicitation	300 solicitations	900	95 solicitations	285
Operations level					
Provide utilities and space	\$15 per machine hour	300 machine hours	4,500	50 machine hours	750
Total activity costs assigned to services			\$ 22,000		\$ 9,120
Total volume			110,000		48,000
Activity costs per unit (total activity costs ÷ total volume)			\$ 0.20		\$ 0.19
Cost summary					
Direct materials cost			\$ 7,700		\$ 5,280
Postage costs			17,600		7,680
Activity costs (includes labor and overhead)			22,000		9,120
Total costs for month			\$ 47,300		\$22,080
Unit cost (total costs for month ÷ total volume)			\$.43		\$.46

- At the service level, Marcus included the costs of all activities required to develop data bases for new clients and to solicit new business for WDSI, and he used design hours and number of solicitations as the cost drivers.
- Finally, at the operations level, Marcus included the costs of all activities related to providing utilities and space. He used machine hours as the cost driver.

Marcus prepared a bill of activities for one month ending May 31, 20x1. He supported each activity's cost with information about the activity cost rate and the cost driver level. He also calculated the total activity costs and activity cost per unit assigned to each type of service. At the bottom of the bill of activities for the month, Marcus prepared a summary of the total costs of the services and calculated the unit cost for each service (the total costs divided by the number of units mailed).

The cost information gathered in the bill of activities helped Carl Marcus estimate the company's profits by allowing him to compare his costs with his revenues. To be competitive, he is currently offering the Classic Letter service for \$.50 per letter and the Self-Mailer service for \$.45 per mailer. The Classic Letter service is generating a positive gross margin of \$.07 (\$.50 – \$.43) per letter, but the Self-Mailer service shows a negative gross margin of \$.01 (\$.45 – \$.46) per mailer. Marcus must find ways to increase fee revenue, reduce costs, or increase service volume for the Self-Mailer service. ABC can help him reduce costs, because the activity costs, including labor and overhead, are categorized by activities and grouped into activity levels. Marcus can examine those activities to identify and reduce or eliminate some of the company's nonvalue-adding activities.

Activity-Based Costing for Selling and Administrative Activities

Activity-based costing may also be used for nonmanufacturing costs. For example, selling and administrative expenses may be pooled by activity and applied to products, services, customer groups, or sales territories. Because customer groups and sales territories differ in their complexity and diversity, each should support its related costs. Customers who buy the most products or services often place larger or more frequent orders. Thus, a larger portion of the costs of selling and administrative activities can be traced to those customers than to customers who buy smaller amounts or order less frequently. Sales territories can differ in size and number of customers served. As a result, some sales territories may require more support services than other sales territories.

ABC can be used to group selling and administrative activities and assign the costs of those activities to cost objects, such as customer groups and sales territories. For many companies, similar customers, such as distributors or retailers, are often treated as a single group because it is difficult to assign costs to individual customers. The costs of selling and administrative activities include salaries, benefits, depreciation on buildings and equipment, sales commissions, and utilities. Such costs are grouped into activity pools and assigned to cost objects, such as customer groups or sales territories, using cost drivers, such as the number of sales calls, sales orders, invoices, or billings.

Exhibit 2 presents a customer-related income statement for WDSI. A similar format can be used to create an income statement for any cost object. Service organizations typically group clients according to significant characteristics, such as length of time required to perform the service or frequency of service. In our example, Carl Marcus can use the ABC information to review the profitability of each customer or customer group. He can also use the information to compare selling and administrative costs across customer groups or to plan profits based on changes in those activities.

Exhibit 2**Income Statement for a Cost Object**

Western Data Services, Inc.
Customer-Related Income Statement
Gila State Bank
For the Month Ended May 31, 20x1

Fee revenue ($\$.50 \times 12,000$ Classic Letters)	\$6,000
Cost of processing order ($\$.43 \times 12,000$ Classic Letters)	<u>5,160</u>
Gross margin	\$ 840
Less: Selling and administrative activity costs	

Activity	Activity Cost Rate	Cost Driver Level	Activity Cost
Make sales calls	\$12 per sales call	10 sales calls	\$120
Prepare sales orders	\$6 per sales order	25 sales orders	150
Handle inquiries	\$.50 per minute	120 minutes	60
Process credits	\$20 per notice	1 notice	20
Process invoices	\$10 per invoice	12 invoices	120
Follow-ups	\$8 per follow-up	20 follow-ups	160
Process billings and collections	\$4 per billing	24 billings	<u>96</u>
Total selling and administrative activity costs			<u>726</u>
Net income contributed by Gila State Bank			<u>\$ 114</u>

The New Manufacturing Environment and JIT Operations

OBJECTIVE

5 Define the *just-in-time (JIT) operating philosophy* and identify the elements of a JIT operating environment



Organizations today are facing pressures to reinvent themselves at an incredible pace, much like UPS and its spinoff company, eLogistics.net, in the Decision Point at the beginning of this chapter. To manage business change effectively, managers are rethinking their organizational processes and basic operating methods. As a result, one of the management-forged operating philosophies for the new manufacturing environment is JIT. The **just-in-time (JIT) operating philosophy** requires that all resources, including materials, personnel, and facilities, be acquired and used only as needed. Its objective is to reduce or eliminate waste.

Traditionally, a company operated with large amounts of inventory, employed push-through production methods, purchased large amounts of materials with few deliveries, had long production runs with infrequent setups, manufactured large batches of products, and trained each member of its work force to perform a limited number of tasks. (Envision large quantities of mass-produced, identical products of questionable quality waiting to be sold.) Managers determined a change was necessary because

- Large amounts of the organization's space and money were tied up in inventory
- The source of poor-quality materials, products, or services was hard to pinpoint
- The number of nonvalue-adding manufacturing activities was growing
- Accounting for the manufacturing process was becoming ever more complex

To achieve JIT's objective of eliminating waste, management must redesign its operating systems, plant layout, and basic management methods to conform to several basic concepts.

- Simple is better.
- The quality of the product or service is critical.
- The work environment must emphasize continuous improvement.
- Maintaining inventories wastes resources and may hide poor work.
- Activities or functions that do not add value should be eliminated or reduced.
- Goods should be produced only when needed.
- Workers must be multiskilled and must participate in improving efficiency and product quality.

Application of these concepts transforms a business into a JIT operating environment with the objectives of reducing costs, improving product quality, and enhancing productivity. The elements used in a JIT environment to achieve those objectives are described below.

Maintain Minimum Inventory Levels

One objective of the JIT operating philosophy is to maintain minimum inventory levels. In contrast to the traditional environment, in which parts, materials, and supplies are purchased far in advance and stored until the production department needs them, in a JIT environment, materials and parts are purchased and received only when needed. The system lowers costs by reducing (1) the space needed for inventory storage, (2) the amount of materials handling, and (3) the amount of inventory obsolescence. There is less need for inventory control facilities, personnel, and recordkeeping. The amount of work in process inventory waiting to be processed and the amount of working capital tied up in all inventories decrease significantly.

Maintaining minimum inventory levels does increase the risk of stockouts and down time, plus the resulting cost or late revenues. Prior to adopting the JIT operating philosophy, management needs to plan for such risks.

Develop Pull-Through Production Planning and Scheduling

Pull-through production is a system in which a customer's order triggers the purchase of materials and the scheduling of production for the required products. In contrast, traditional manufacturing operations use the **push-through method**, wherein products are manufactured in long production runs and stored in anticipation of customers' orders.

Purchase Materials and Produce Products as Needed, in Smaller Lot Sizes

With pull-through production, the size of a customer's order determines the size of a production run, and the company purchases materials and parts as needed. Low inventory levels are maintained, but machines must be set up more frequently, resulting in more work stoppages.

Perform Quick, Inexpensive Machine Setups

In the past, managers felt that it was more cost effective to produce large inventories because producing small batches increases the number of machine setups. The

success of JIT has disproved this. By placing machines in more efficient locations and scheduling similar products on common machine groupings, setup time can be minimized. In addition, workers become more experienced and more efficient when they perform frequent setups.

Create Flexible Manufacturing Work Cells

In a traditional factory layout, all similar machines are grouped together, forming functional departments. Products are routed through each department in sequence, so that all necessary operations are completed in order. This process can take several days or weeks, depending on the size and complexity of the job.

By changing the factory layout so that all the machines needed for sequential processing are placed together, the JIT operating environment may cut the manufacturing time of a product from days to hours, or from weeks to days. The new cluster of machinery forms a flexible **work cell**, an autonomous production line that can perform all required operations efficiently and continuously. The flexible work cell handles products of similar shape or size—what is called a family of products. Product families require minimum setup changes as workers move from one job to the next. The more flexible the work cell, the greater the potential to minimize total production time.

Develop a Multiskilled Work Force

In the flexible work cells of a JIT environment, workers may be required to operate several types of machines simultaneously. Therefore, they must learn new operating skills. Many work cells are run by only one operator, who, for example, may have to set up and retool machines and even perform routine maintenance on them. A JIT operating environment requires a multiskilled work force, and multiskilled workers have been very effective in contributing to high levels of productivity.

Maintain High Levels of Product Quality

JIT operations result in high-quality products because high-quality direct materials are used and because inspections are routinely made throughout the production process. In the JIT philosophy, inspection as a separate step does not add value to the product, so inspection is incorporated into ongoing operations. A JIT machine operator inspects the products as they pass through the manufacturing process. If an operator detects a flaw, he or she shuts down the work cell and determines its cause. The operator either fixes the problem or helps the engineer or quality control person find a way to correct the problem to prevent the production of similarly flawed products. This integrated inspection procedure, combined with quality raw materials, produces high-quality finished goods.

Enforce a System of Effective Preventive Maintenance

When a company rearranges its machinery into flexible manufacturing cells, each machine becomes an integral part of its cell. If one machine breaks down, the entire cell stops functioning. Because the product cannot be easily routed to another machine while the malfunctioning machine is being repaired, continuous JIT operations require an effective system of preventive maintenance. Preventing machine breakdowns is considered more important and more cost-effective than keeping machines running continuously. Machine operators are trained to perform minor repairs as they detect problems. Machines are serviced regularly—much like an automobile—to help guarantee continued operation. The machine operator

conducts routine maintenance during periods of downtime between orders. (Remember that in a JIT setting, the work cell does not operate unless there is a customer order for the product. Machine operators take advantage of such downtime to perform maintenance.)

Encourage Continuous Improvement of the Work Environment

The JIT environment fosters loyalty among workers, who are likely to see themselves as part of a team because they are so deeply involved in the production process. Machine operators must have the skills to run several types of machines, detect defective products, suggest measures to correct problems, and maintain the machinery within their work cell. In addition, each worker is encouraged to make suggestions for improving the production process. Companies with a JIT environment receive thousands of employee suggestions and implement a high percentage of them. And workers are rewarded for suggestions that improve the process. Such an environment supports workers' initiative and benefits the company.

Accounting for Product Costs in the New Manufacturing Environment

OBJECTIVE
6 Identify the changes in product costing that result when a firm adopts a JIT operating environment

When a firm shifts from a traditional to the new manufacturing environment, the management accounting system must take a new approach to evaluating costs and controlling operations. The changes in the manufacturing operations will affect how costs are determined and what measures are used to monitor performance. This section examines how product costing procedures can be changed to determine accurate costs for products manufactured in a JIT operating environment. It looks at changes in how costs are categorized and assigned, and the next section explains how backflush costing is used to compute product costs.

Classifying Costs

The JIT work cell and the goal of reducing or eliminating nonvalue-adding activities change the way costs are classified and assigned in a JIT operating environment. The traditional production process can be divided into five parts, or time frames:

- Processing time** The actual amount of time spent working on a product
- Inspection time** The time spent either looking for product flaws or reworking defective units
- Moving time** The time spent moving a product from one operation or department to another
- Queue time** The time a product spends waiting to be worked on once it arrives at the next operation or department
- Storage time** The time a product spends in materials storage, work in process inventory, or finished goods inventory

In product costing under JIT, costs associated with processing time are categorized as either direct materials costs or conversion costs. **Conversion costs** include the total of direct labor costs and manufacturing overhead costs incurred by a production department, JIT work cell, or other work center. In product cost-

FOCUS ON INTERNATIONAL BUSINESS

For just-in-time manufacturing processes to work, companies need just-in-time purchasing from reliable suppliers. To help the information flow between suppliers and their customers, many organizations use Internet-based information systems, such as System



Applications Products (SAP), developed by SAP AG, a German company. For example, in SAP, a supplier can access a customer's data base for materials to see how much material is needed and how much material has been sent. The supplier can replenish empty inventory bins by initiating shipments to meet just-in-time delivery schedules. SAP also provides electronic support for inventory control, job processing, and contract processing.⁵

ing under JIT, costs associated with inspection, moving, queue, and storage time should be reduced or eliminated because they do not add value to the product.

Assigning Costs

In the JIT operating environment, the key measure is **throughput time**, the time it takes to move a product through the entire production process. Measures of product movement, such as machine time, are used to apply conversion costs to products.

Sophisticated computer monitoring of the work cells allows many costs to be traced directly to the cells where products are manufactured. As Table 3 shows, several costs that used to be treated as indirect costs and applied to products using a manufacturing overhead rate are treated as direct costs of a work cell. They are directly traceable to the JIT production cell. Because each cell manufactures similar products to minimize setup time, direct materials and conversion costs should be nearly uniform for each product in a cell. The costs of materials handling, utilities, operating supplies, and supervision can be traced directly to work cells as they are incurred. Depreciation charges are based on units of output, not on time, so depreciation can also be charged directly to work cells based on the number of units produced. Building occupancy costs, property and casualty insurance premiums, and property taxes remain indirect costs and must be assigned to the production cells for inclusion in the conversion cost.

Table 3. Changes Caused by JIT: Direct Versus Indirect Costs

Traditional Environment		JIT Environment
Direct	Direct materials and parts	Direct
Direct	Direct labor	Direct
Indirect	Repairs and maintenance	Direct to work cell
Indirect	Materials handling	Direct to work cell
Indirect	Operating supplies	Direct to work cell
Indirect	Utility costs	Direct to work cell
Indirect	Supervision	Direct to work cell
Indirect	Depreciation	Direct to work cell
Indirect	Supporting service functions	Mostly direct to work cell
Indirect	Building occupancy	Indirect
Indirect	Insurance and taxes	Indirect

Backflush Costing

OBJECTIVE

7 Define and apply *backflush costing*, and compare the cost flows in traditional and backflush costing

In a just-in-time environment, managers continuously seek ways to reduce wasted resources and time. So far, we have focused on how waste can be trimmed from production operations, but waste can also be reduced in other areas. For example, it is possible to decrease the amount of time it takes to record and account for the costs of the production process. This is accomplished by simplifying the cost flow through the accounting records. First, because labor costs are reduced in a JIT environment, the accounting system combines direct labor costs and manufacturing costs into a single category, conversion costs. Second, because materials arrive just in time to be used in the production process, there is little reason to maintain a separate Materials Inventory account.

A JIT organization may also streamline its accounting process by using backflush costing. When **backflush costing** is used, all product costs are first accumulated in the Cost of Goods Sold account. Then, at period end, the costs are “flushed back,” or worked backward, into the appropriate inventory accounts. The objective is to save recording time by having all product costs flow straight to a final destination and then, at period end, working backward to determine the proper balances for the inventory accounts. This approach avoids the recording of several transactions, as illustrated in Figure 4 and the following section.

Comparison of Cost Flows in Traditional and Backflush Costing

The cost flows in a traditional costing system are illustrated at the top of Figure 4. When direct materials arrive at the factory, their costs flow into the Materials Inventory account. Then, when the direct materials are requisitioned into production, their costs flow into the Work in Process Inventory account. When direct labor is used, its costs are added to the Work in Process Inventory account. Manufacturing overhead is applied to production using a base such as direct labor hours, machine hours, or number of units produced. The amount of applied overhead is added to the other costs in the Work in Process Inventory account. At the end of the manufacturing process, the costs of the finished units are transferred to the Finished Goods Inventory account, and when the units are sold, their costs are transferred to the Cost of Goods Sold account.

In a JIT setting, direct materials arrive just in time to be placed into production. When backflush costing is used, the direct materials costs and the conversion costs (direct labor and manufacturing overhead) are immediately charged to the Cost of Goods Sold account. At the end of the period, the costs of goods in work in process inventory and in finished goods inventory are determined, and those costs are flushed back to the Work in Process Inventory account and the Finished Goods Inventory account. Once those costs have been flushed back, the Cost of Goods Sold account contains only the costs of units completed and sold during the period. The cost flows in a backflush costing system are shown in the bottom diagram in Figure 4.

To illustrate, assume that the following transactions occurred at Allegro Company last month:

1. Purchased \$20,000 of direct materials on account.
2. Used all of the direct materials in production during the month.
3. Incurred direct labor costs of \$8,000.
4. Applied \$24,000 of manufacturing overhead to production.

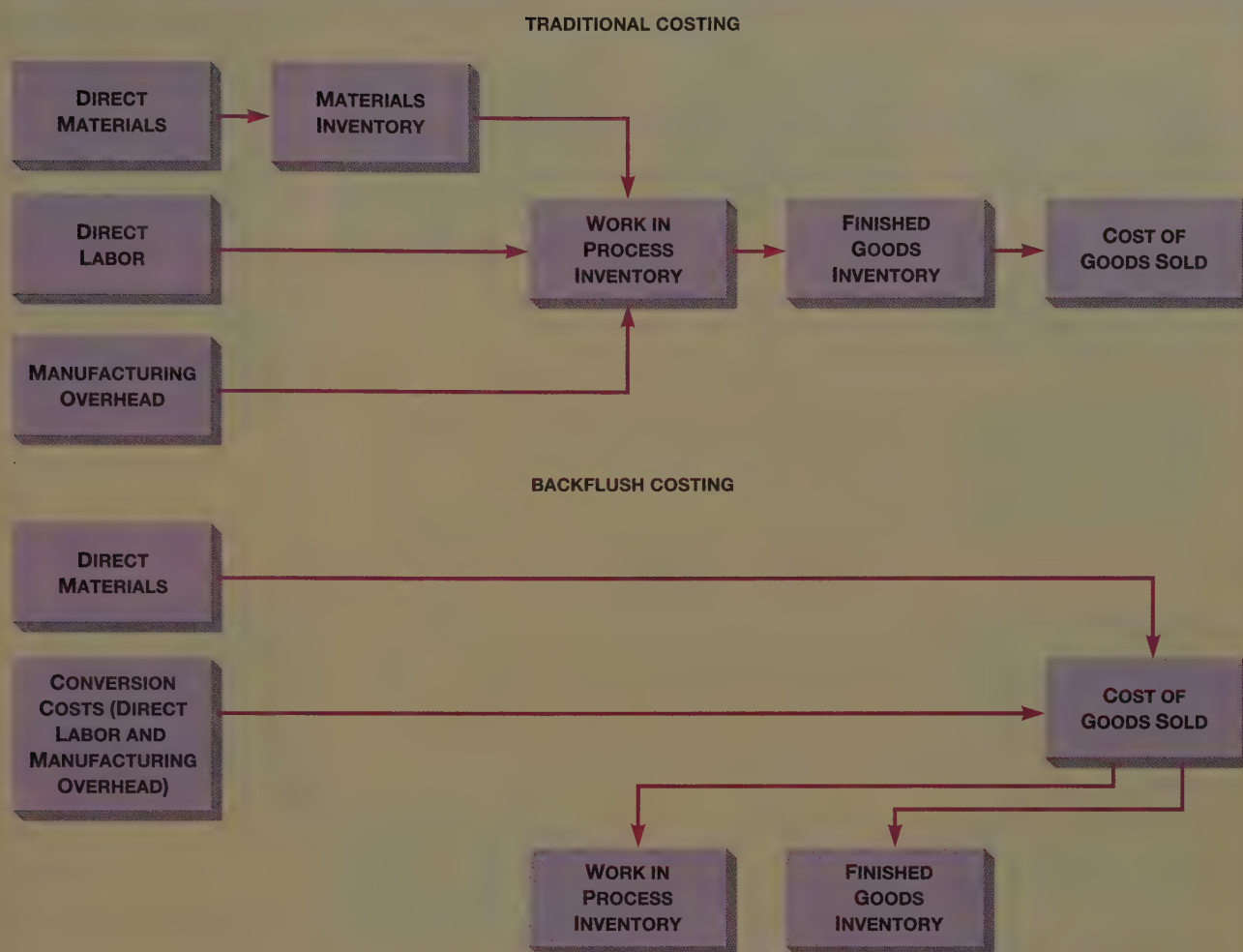


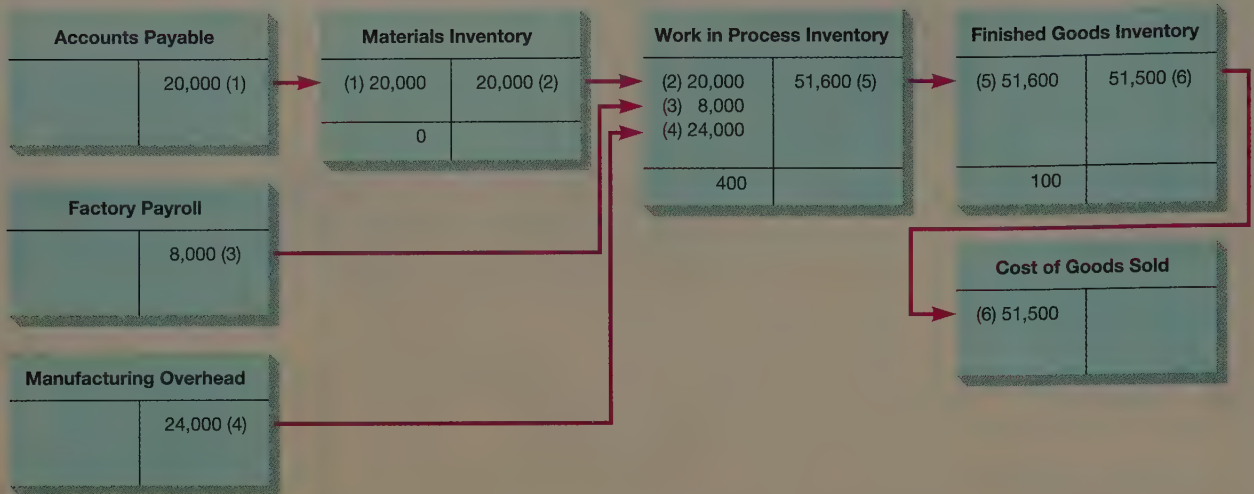
Figure 4
Comparison of Cost Flows in
Traditional and Backflush
Costing

5. Completed units costing \$51,600 during the month.
6. Sold units costing \$51,500 during the month.

The top diagram in Figure 5 shows how those transactions would be entered in T accounts when traditional product costing is used. You can trace the flow of each cost by following its transaction number.

The bottom diagram in Figure 5 shows how the same transactions would be treated in a JIT environment using backflush costing. The cost of direct materials (Transaction 1) is charged directly to the Cost of Goods Sold account. Transaction 2 is not included because there is no Materials Inventory account when backflush costing is used. The costs of direct labor (Transaction 3) and manufacturing overhead (Transaction 4) are combined in the Conversion Costs account and transferred to the Cost of Goods Sold account. The total in the Cost of Goods Sold account is then \$52,000 (\$20,000 for direct materials and \$32,000 for conversion costs). Once all product costs for the month have been entered in the Cost of Goods Sold account, the amounts to be transferred to the inventory accounts are calculated. The amount to be transferred to the Work in Process Inventory account

TRADITIONAL COSTING



BACKFLUSH COSTING

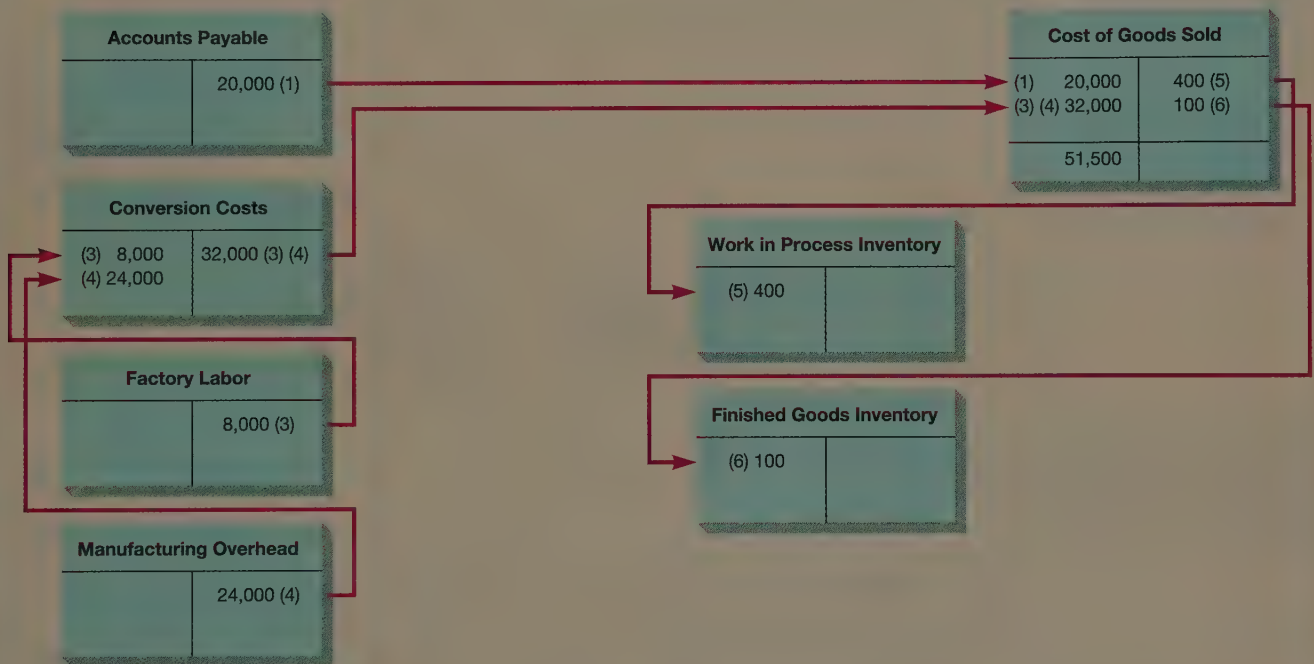


Figure 5
Cost Flows Through T Accounts
in Traditional and Backflush
Costing

is determined by subtracting the cost of completed units (Transaction 5) from the total costs charged to the Cost of Goods Sold Account ($\$52,000 - \$51,600 = \$400$). The amount to be transferred to the Finished Goods Inventory account is calculated by subtracting the cost of units sold (Transaction 6) from the cost of completed units ($\$51,600 - \$51,500 = \$100$). The ending balance in the Cost of Goods Sold account is $\$51,500$, which is the same as the ending balance when traditional costing is used. The difference is that backflush costing enabled us to use fewer accounts and to avoid recording several transactions.

Comparison of ABM and JIT

OBJECTIVE

8 Compare ABM and JIT as activity-based systems

The purposes of ABM and JIT are similar. As activity-based systems, both analyze processes and identify value-adding and nonvalue-adding activities. Both seek to eliminate waste and reduce nonvalue-adding activities to improve product or service quality, reduce costs, and improve the organization's efficiency and productivity. Both improve the quality of the information managers use to make decisions about bidding, pricing, product lines, and outsourcing. However, the two systems differ in their methods of costing and cost assignment.

ABM's tool, ABC, helps calculate product cost using cost drivers to assign the indirect costs of production activities to cost objects more accurately. ABC affects only the assignment of manufacturing overhead costs to the products; the costs of direct materials and direct labor are directly traced to products and are unaffected by ABC. ABC is often a fairly complex accounting method used with job order and process costing systems. Note that the ABC method can also be used to examine nonproduction-related activities, such as marketing and shipping.

JIT reorganizes many activities so that they are performed within work cells. The costs of those activities become direct costs to the work cell and to the products made by the work cell. The total production costs within the work cell can then be assigned using simple cost drivers such as process hours or direct materials cost. Companies that have implemented JIT manufacturing may use backflush costing rather than job order costing or process costing. This approach focuses on the output at the end of the production process and simplifies the accounting system. The characteristics of ABM and JIT are summarized in Table 4.

eLogistics.net, presented in the Decision Point at the beginning of the chapter, can both use and provide JIT and ABM/ABC information. The company can use ABM/ABC to better determine the cost of its services and to reduce or eliminate business activities that do not add value for its customers. It will apply the JIT operating philosophy to simplify processes, use resources effectively, and eliminate waste. It can provide information to customers using activity-based systems that will enable those customers to improve inventory management, production scheduling, and product or service costing. Organizations that want to remain competitive will want to use ABM/ABC and JIT to keep pace with the speed of change. Each will select the JIT or ABM systems that best fit the needs of its long-range plan.



Table 4. Comparison of ABM and JIT Activity-Based Systems

	ABM	JIT
Purpose	Reduce or eliminate nonvalue-adding activities	Reduce or eliminate waste
Cost assignment	Use ABC to assign manufacturing overhead costs to the product cost by using appropriate cost drivers	Reorganize activities so that they are performed within work cells and manufacturing overhead costs incurred in the work cell become direct costs of the products made in the work cell
Costing method	Integrate ABC with either job order or process costing to calculate product costs	May use backflush costing to calculate product costs when the products are completed

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

- 1. Explain the role of activity-based systems in the management cycle.** Activity-based systems are information systems that provide quantitative information about activities in an organization. Because activity-based systems help managers view the organization as a collection of related activities, they enable managers to improve operating processes and make better pricing decisions. During the planning phase of the management cycle, activity-based systems help managers identify value-adding activities, determine the resources needed for those activities, and estimate product costs. In the executing and reviewing stages, these systems help managers determine the full product or service cost, identify actions that will reduce the full product or service cost, and determine if cost-reduction goals for nonvalue-adding activities were reached. Activity-based systems also help managers report the cost of inventory and determine the degree to which product goals were achieved.
- 2. Define activity-based management (ABM) and discuss its relationship with the supply network and the value chain.** Activity-based management (ABM) is an approach to managing an organization that identifies all major operating activities. It determines what resources are consumed by each activity, identifies how resources are consumed by each activity, and categorizes the activities as either adding value to a product or service or not adding value. ABM enables managers to see their organization as a collection of value-creating activities (a value chain) operating as part of a larger system that includes suppliers' and customers' value chains (a supply network). This perspective helps managers work cooperatively both within and outside their organization to reduce costs by eliminating waste and inefficiencies and by redirecting resources toward value-adding activities.
- 3. Distinguish between value-adding and nonvalue-adding activities, and describe process value analysis.** A value-adding activity is an activity that adds value to a product or service as perceived by the customer. Examples include preparing the engineering design of a new car, assembling the car, painting the car, and installing seats and airbags. A nonvalue-adding activity is an activity that adds cost to a product or service but does not increase market value. Examples include the repair of machines, shop floor clean-up activities, moving materials, and building maintenance. Process value analysis (PVA) is an analytical method of identifying all activities and relating them to events that cause or drive the need for the activities and the resources consumed.
- 4. Define activity-based costing, and explain how a cost hierarchy and a bill of activities are used.** Activity-based costing (ABC) is a method of assigning costs that calculates a more accurate product cost by identifying all of an organization's major operating activities. It traces the indirect costs to those activities and assigns activity costs to products using a cost driver that is related to the cause of the cost.

For ABC product costing, managers (1) identify and classify each activity, (2) estimate the cost of resources for each activity, (3) identify a cost driver for each activity and estimate the quantity of each cost driver, (4) calculate an activity cost rate for each activity, and (5) allocate all costs to cost objects based on the level of activity required to make the product or provide the service. Two tools—a cost hierarchy and a bill of activities—help in the implementation of ABC. To create a cost hierarchy, activities are identified and classified into four levels. Unit-level activities are performed each time a unit is produced. Batch-level activities are performed each time a batch of goods is pro-

duced. Product-level activities are performed to support the diversity of products in a manufacturing plant. Facility-level activities are performed to support a facility's general manufacturing process. A bill of activities is then used to compute the costs assigned to activities and the product or service unit cost.

- 5. Define the *just-in-time (JIT)* operating philosophy and identify the elements of a JIT operating environment.** Just-in-time (JIT) is an operating philosophy in which all resources, including materials, personnel, and facilities, are used only as needed. The objective is to reduce or eliminate waste. The elements of a JIT operating environment are (1) maintain minimum inventory levels; (2) develop pull-through production planning and scheduling; (3) purchase materials and produce parts as needed, in smaller lot sizes; (4) perform quick, inexpensive machine setups; (5) create flexible manufacturing work cells; (6) develop a multiskilled work force; (7) maintain high levels of product quality; (8) enforce a system of effective preventive maintenance; and (9) encourage continuous improvement of the work environment.
- 6. Identify the changes in product costing that result when a firm adopts a JIT operating environment.** In product costing under JIT, processing costs are categorized as either direct materials costs or conversion costs. The costs associated with inspection time, moving time, queue time, and storage time are reduced or eliminated. Computerized facilities improve cost tracking, so that many costs that are considered indirect or overhead costs in traditional manufacturing settings, such as electricity and factory supplies, can be traced directly to work cells. Only costs associated with building occupancy, insurance, and property taxes remain indirect costs and must be assigned to work cells.
- 7. Define and apply *backflush costing*, and compare the cost flows in traditional and backflush costing.** Backflush costing is commonly used to account for product costs in a JIT operating environment. When backflush costing is used, all product costs are first accumulated in the Cost of Goods Sold account. Then, at period end, the costs are "flushed back," or worked backward, into the appropriate inventory accounts. This differs from the traditional approach, in which the Materials Inventory account is used to record the costs of materials purchased and used and the Work in Process Inventory account is used to record the costs of direct materials, direct labor, and manufacturing overhead during the production process. The objective of backflush costing is to save recording time, which cuts costs.
- 8. Compare ABM and JIT as activity-based systems.** ABM and JIT have similar purposes in that both, as activity-based systems, seek to eliminate or reduce nonvalue-adding activities or waste. ABM and JIT differ in their approaches to cost assignment and calculation of product cost. ABM uses ABC to assign indirect costs to products using cost drivers, whereas JIT reorganizes activities so that they are performed within work cells and the manufacturing overhead costs incurred in a work cell become direct costs of the products produced in that work cell. ABM uses job order or process costing to calculate product costs, whereas JIT may use backflush costing.

REVIEW OF CONCEPTS AND TERMINOLOGY

LO 4

The following concepts and terms were introduced in this chapter:

Activity-based costing: A method of assigning costs that calculates a more accurate product cost by identifying all of an organization's major operating activities, tracing the indirect costs to those activities, and assigning activity costs to products using a cost driver that is related to the cause of the cost.

- L0 2 Activity-based management (ABM):** An approach to managing an organization that identifies all major operating activities, determines what resources are consumed by each activity, identifies how resources are consumed by each activity, and categorizes the activities as either adding value to a product or service or not adding value; emphasis is on the reduction or elimination of nonvalue-adding activities.
- L0 1 Activity-based system:** An information system that provides quantitative information about the activities in an organization.
- L0 7 Backflush costing:** A product costing approach, used in a JIT operating environment, in which all product costs are first accumulated in the Cost of Goods Sold account and then, at period end, flushed back into the appropriate inventory accounts.
- L0 4 Batch-level activities:** Activities performed each time a batch of goods is produced; such activities vary with the number of batches prepared.
- L0 4 Bill of activities:** A list of activities and related costs that is used to compute the costs assigned to activities and the product unit cost.
- L0 6 Conversion costs:** The total of direct labor costs and manufacturing overhead costs incurred by a production department, JIT work cell, or other work center.
- L0 4 Cost hierarchy:** A framework for classifying activities according to the level at which their costs are incurred.
- L0 4 Facility-level activities:** Activities performed to support a facility's general manufacturing process.
- L0 1 Full product cost:** A cost that includes not only the costs of direct materials and direct labor, but also the costs of all production and nonproduction activities required to satisfy the customer.
- L0 6 Inspection time:** The time spent either looking for product flaws or reworking defective units.
- L0 5 Just-in-time (JIT) operating philosophy:** An operating philosophy that requires that all resources, including materials, personnel, and facilities, be acquired and used only as needed; its objective is to reduce or eliminate waste.
- L0 6 Moving time:** The time spent moving a product from one operation or department to another.
- L0 3 Nonvalue-adding activity:** An activity that adds cost to a product or service but does not increase its market value.
- L0 6 Processing time:** The actual amount of time spent working on a product.
- L0 3 Process value analysis (PVA):** An analytical method of identifying all activities and relating them to the events that cause or drive the need for the activities and the resources consumed.
- L0 4 Product-level activities:** Activities performed to support the diversity of products in a manufacturing plant.
- L0 5 Pull-through production:** A production system in which a customer's order triggers the purchase of materials and the scheduling of production for the required products.
- L0 5 Push-through method:** A production system in which products are manufactured in long production runs and stored in anticipation of customers' orders.
- L0 6 Queue time:** The time a product spends waiting to be worked on once it arrives at the next operation or department.
- L0 6 Storage time:** The time a product spends in materials storage, work in process inventory, or finished goods inventory.
- L0 2 Supply network:** An interdependent web of organizations that supplies materials, products, or services to a customer.

- L0 6 Throughput time:** The time it takes to move a product through the entire production process.
- L0 4 Unit-level activities:** Activities performed each time a unit is produced; such activities vary with the number of units produced.
- L0 3 Value-adding activity:** An activity that adds value to a product or service as perceived by the customer.
- L0 2 Value chain:** A related sequence of value-creating activities in an organization.
- L0 5 Work cell:** An autonomous production line that can perform all required operations efficiently and continuously.

REVIEW PROBLEM

Activity-Based Costing

- L0 4** Alvelo Corporation produces more than a dozen types of boat motors. The 240-horsepower motor is the most expensive and most difficult to produce. The 60-horsepower model is the easiest to produce and is the leading seller for the company. The other models range from 70 horsepower to 220 horsepower and get more complex as the horsepower increases. Rodak Company recently ordered 175 of the 80-horsepower model. Song Shin, the controller of Alvelo Corporation, is interested in testing the activity-based approach to product costing on this order because the company is considering a shift to that method. Costs directly traceable to the Rodak order are as follows:

Direct materials	\$57,290
Purchased parts	\$76,410
Direct labor hours	1,320
Average direct labor pay rate per hour	\$14.00

Other operating costs are as follows:

Traditional costing approach:

Manufacturing overhead costs were applied at a rate of 320 percent of direct labor dollars.

Activity-based costing approach:

Activity	Cost Driver	Activity Cost Rate	Activity Usage for Rodak Order
Product design	Engineering hours	\$62 per engineering hour	76 engineering hours
Work cell setup	Number of setups	\$90 per setup	16 setups
Parts production	Machine hours	\$38 per machine hour	380 machine hours
Assembly	Direct labor hours	\$19 per direct labor hour	84 direct labor hours
Product simulation	Testing hours	\$90 per testing hour	28 testing hours
Packaging and shipping	Product units	\$26 per unit	175 units
Building occupancy	Direct labor cost	125% of direct labor cost	\$18,480 direct labor cost

REQUIRED

1. Use the traditional costing approach to compute the total cost and the product unit cost of the Rodak order.
2. Using the cost hierarchy, identify the level at which each activity occurs: the unit level, batch level, product level, or facility level.
3. Prepare a bill of activities for the operating costs.
4. Using the activity-based costing approach, compute the total cost and the product unit cost of the Rodak order.
5. What difference in the product unit cost of the Rodak order resulted from the shift to activity-based costing? Does the use of activity-based costing guarantee cost reduction for every order?

ANSWER TO REVIEW PROBLEM

1. Apply the traditional costing approach to the Rodak order.

Direct materials	\$ 57,290
Purchased parts	76,410
Direct labor	18,480
Manufacturing overhead (320% of direct labor dollars)	59,136
Total cost of order	<u>\$ 211,316</u>
Product unit cost (total cost ÷ 175 units)	<u>\$1,207.52</u>

2. Assign activities to the categories of the cost hierarchy.

Unit level:	Parts production Assembly Packaging and shipping
Batch level:	Work cell setup
Product level:	Product design Product simulation
Facility level:	Building occupancy

- 3 and 4. Create a bill of activities and apply activity-based costing to the Rodak order.

Alvelo Corporation Bill of Activities Rodak Order

Activity	Activity Cost Rate	Cost Driver Level	Activity Cost
Unit level			
Parts production	\$38 per machine hour	380 machine hours	\$ 14,440
Assembly	\$19 per direct labor hour	84 direct labor hours	1,596
Packaging and shipping	\$26 per unit	175 units	4,550
Batch level			
Work cell setup	\$90 per setup	16 setups	1,440
Product level			
Product design	\$62 per engineering hour	76 engineering hours	4,712
Product simulation	\$90 per testing hour	28 testing hours	2,520
Facility level			
Building occupancy	125% of direct labor cost	\$18,480 direct labor cost	23,100
Total activity costs assigned to job			<u>\$ 52,358</u>
Total units of job			<u>175</u>
Activity costs per unit (total activity costs ÷ total units)			<u>\$ 299.19</u>
Cost summary			
Direct materials			\$ 57,290
Purchased parts			76,410
Direct labor			18,480
Activity costs			52,358
Total cost of order			<u>\$ 204,538</u>
Product unit cost (total cost ÷ 175 units)			<u>\$1,168.79</u>

5. Compare traditional costing and ABC costing.

Product unit cost—traditional costing approach	\$1,207.52
Product unit cost—activity-based costing approach	1,168.79
Difference	<u>\$ 38.73</u>

In this case, the ABC product unit cost is lower than the product unit cost computed using the traditional costing approach. But activity-based costing does not guarantee cost reduction for every product. It does improve cost traceability, which often identifies products undercosted or overcosted by a traditional product costing system.

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. How do companies measure customer value? What can managers do to create value and satisfy customers' needs?
2. Define an activity-based system. Identify two activity-based systems. What are some benefits of using activity-based systems?
3. How is cost information from activity-based systems used in each of the four stages of the management cycle?
4. What assumption should managers make about resource-consuming activities when they estimate a product or service unit cost?
5. What is the value of gathering quantitative information at the activity level?
6. What is activity-based management (ABM)? How does ABM benefit both strategic planning and operational decision making?
7. How does a supply network differ from a value chain?
8. What is the difference between a value-adding activity and a nonvalue-adding activity? Give an example of each.
9. Define process value analysis.
10. What is activity-based costing?
11. List the five steps of activity-based product costing.
12. List and define the four categories in the cost hierarchy for a manufacturing company.
13. What is a bill of activities?
14. What is pull-through production? In what ways does it differ from push-through production?
15. What changes occur in the responsibilities of a machine operator in the JIT operating environment?
16. How does the inspection function change in a JIT environment?
17. Why is preventive maintenance of machinery critical to the operation of a JIT work cell?
18. How has the movement to JIT operations affected the classification of costs?
19. When is backflush costing used? How does it reduce the time spent on recordkeeping?
20. How do ABM and JIT differ in their approaches to product costing?

SHORT EXERCISES

- SE 1.** Amber Waglow started a retail clothing business two years ago. Waglow's first year was very successful, but sales dropped 50 percent in the second year. Waglow's friend, a business consultant, analyzed her business and came up with two basic reasons for the decline in sales: (1) Waglow has been placing orders late in each season, and (2) shipments of

LO 1 Activity-Based Systems

clothing have been arriving late and in poor condition. What measures can Waglow take to improve her business and persuade customers to return?

LO 2 Identifying a Product's Value Chain

SE 2.

Which of the following activities would be part of the value chain of a manufacturing company? Which activities do not add value?

1. Product inspection
2. Machine drilling
3. Materials storage
4. Product engineering
5. Plating/packing
6. Cost accounting
7. Moving work in process
8. Inventory control

LO 2 Supply Network

SE 3.

Teddy DuBois is developing plans to open Ribs 'n Slaw restaurant. He has located a building and will lease all the furniture and equipment he needs to place his restaurant in operation. Food Servers, Inc., will supply all of the restaurant's personnel. Identify the components of Ribs 'n Slaw's supply network.

LO 3 Value-Adding Versus Nonvalue-Adding Activities

SE 4.

Identify which of the following activities related to a local submarine sandwich shop are value-adding (V) and which are nonvalue-adding (NV).

1. Purchasing sandwich ingredients
2. Storing condiments
3. Making sandwiches
4. Cleaning up the shop
5. Making home deliveries
6. Accounting for store sales and costs

LO 4 ABC Cost Hierarchy

SE 5.

Engineering design is vital to the success of any motor vehicle manufacturing company. Based on the four categories of the cost hierarchy in an activity-based costing system, how would the engineering design activity be classified for:

1. The maker of unique, single editions of Rolls Royces
2. The maker of built-to-order city and county emergency vehicles (orders are usually placed for 10 to 12 identical vehicles)
3. The maker of a line of automobiles sold throughout the world

LO 4 ABC Cost Hierarchy

SE 6.

Match the four categories of the cost hierarchy to the following activities of a dress manufacturer that uses activity-based management.

1. Routine maintenance of sewing machines
2. Designing a pattern for a new dress style
3. Sewing seams on a garment
4. Producing 100 blue dresses of a certain style

LO 5 Elements of a JIT Operating Environment

SE 7.

Maintaining minimum inventory levels, developing pull-through production planning and scheduling, and purchasing materials as needed in smaller lot sizes are three elements of a just-in-time operating environment. How do pull-through production and producing as needed help to accomplish the objective of minimizing inventories?

LO 6 Product Costing Changes in a JIT Environment

SE 8.

Zahn Tool Products Company is in the process of adopting the just-in-time operating philosophy for its tool-making operations. Identify which of the following manufacturing overhead costs are nonvalue-adding costs (NVA) and which can be traced directly to the new tool-making work cell (D).

1. Storage barrels for work in process inventory
2. Inspection labor
3. Machine electricity
4. Machine repairs
5. Depreciation of the storage barrel movers
6. Machine setup labor

LO 7 Backflush Costing

SE 9.

During August, Duke Printing Company incurred direct materials costs of \$123,450 and conversion costs of \$265,200. The company employs a just-in-time operating philosophy and a backflush costing system. At the end of August, it was determined that the Work in Process Inventory account had been assigned \$980 of costs and the ending balance of the Finished Goods Inventory account was \$1,290. There were no beginning inventory balances. How much was charged to the Cost of Goods Sold account during August? What was the ending balance of Cost of Goods Sold?

LO 8 ABM and JIT Compared**SE 10.**

Huang Corp. recently completed the installation of three just-in-time work cells in its Screen-Making Division. The work cells will make large quantities of products for major window- and door-producing companies. Should Huang use backflush costing or ABM/ABC to account for product costs? Defend your choice of activity-based system.

EXERCISES**LO 1 ABM Management Reports****E 1.**

Compare the following reports of a department in an insurance company. Identify the report that would be used for financial purposes and the one that would be used for ABM decision making. Why would the reports differ?

Salaries	\$ 1,400	Key/scan claims	\$ 2,000
Equipment	1,200	Analyze claims	1,000
Travel expenses	8,000	Suspend claims	1,500
Supplies	300	Receive inquiries	1,500
Use and occupancy	3,000	Resolve problems	400
		Process batches	3,000
		Determine eligibility	4,000
		Make copies	200
		Write correspondence	100
		Attend training	200
Total	<u>\$13,900</u>	Total	<u>\$13,900</u>

LO 2 Supply Networks and Value Chains**E 2.**

Identify which of these people, events, and activities associated with a lawn and garden nursery are part of the supply network (S) and which are part of the value chain (V):

- | | |
|--------------------------------------|--------------------------------|
| 1. Plant and tree vendor | 5. Advertising company manager |
| 2. Purchasing potted trees | 6. Scheduling delivery trucks |
| 3. Computer and software salesperson | 7. Customer service |
| 4. Creating marketing plans | |

LO 2 Supply Network and Value Chains**E 3.**

Identify which of the following events and activities associated with a hotel are part of the supply network (S) and which are part of the value chain (V).

- | | |
|----------------------------------|---------------------|
| 1. Travel agency | 4. Customer service |
| 2. Housekeeping supplies | 5. Travel web site |
| 3. Special events and promotions | 6. Tour agencies |

LO 3 Process Value Analysis**E 4.**

Perez Enterprises has been in business for 30 years. Last year, the company purchased Chemcraft Laboratory and entered the chemical processing business. Perez's controller prepared a process value analysis of the new operation and identified the following activities:

New product research	Product sales	Product bottling process
Solicitation of vendor bids	Packaging process	Product warranty work
Materials storage	Materials inspection	Product engineering
Product curing process	New product marketing	Purchasing of direct materials
Product scheduling	Product inspection	Finished goods storage
Product spoilage	Product delivery	Processing areas clean-up
Customer follow-up	Materials delivery	Product mixing process

From the list above, identify the value-adding activities and classify them into the activity areas of the value chain illustrated in Figure 2. Prepare a separate list of the non-value-adding activities.

LO 3 Value-Adding Activities**E 5.**

When Courtney Erbes prepared a process value analysis for her company, she identified the following primary activities. Identify the value-adding activities.

- | | |
|--------------------------|-----------------------|
| 1. Production scheduling | 5. Engineering design |
| 2. Customer follow-up | 6. Product marketing |
| 3. Materials moving | 7. Product sales |
| 4. Product inspection | |

LO 4 ABC Cost Hierarchy

- E 6.** Copia Electronics makes speaker systems. Its customers range from new hotels and restaurants that need specially designed sound systems to nationwide retail outlets that order large quantities of similar products. The following activities are part of the company's operating process:

New product design	Direct materials costs	Assembly labor costs
Product line marketing	Repairing the building	Assembly line setup
Unique system design	Sales commissions	Securing the building
Unique system packaging	Bulk packing of orders	Production line supervision

Classify each activity as either unit level (UL), batch level (BL), product level (PL), or facility level (FL).

LO 4 Bill of Activities

- E 7.** Complete the following bill of activities for Alachua Corporation's handheld computer order for Union LLC.

Alachua Corporation
Bill of Activities
Union LLC Order

Activity	Activity Cost Rate	Cost Driver Level	Activity Cost
Unit level			
Parts production	\$50 per machine hour	200 machine hours	\$?
Assembly	\$20 per direct labor hour	100 direct labor hours	?
Packaging and shipping	\$12.50 per unit	400 units	?
Batch level			
Work cell setup	\$100 per setup	16 setups	?
Product level			
Product design	\$60 per engineering hour	80 engineering hours	?
Product simulation	\$80 per testing hour	30 testing hours	?
Facility level			
Building occupancy	200% of direct labor cost	?	?
Total activity costs assigned to job			\$?
Total units of job			400
Activity costs per unit (total activity costs ÷ total units)			\$?
Cost summary			
Direct materials			\$60,000
Purchased parts			80,000
Direct labor			20,000
Activity costs			?
Total cost of order			\$?
Product unit cost (total cost ÷ 400 units)			\$?

LO 4 Activity Cost Rates

- E 8.** Compute the activity cost rates for materials handling and design based on the following information.

Materials:	
Cloth	\$26,000
Fasteners	4,000
Purchased parts	40,000

Materials handling:	
Labor	\$8,000
Equipment depreciation	5,000
Electrical power	2,000
Maintenance	6,000
Direct labor:	
Machinists	5,000
Design:	
Labor	5,000
Electrical power	1,000
Overhead	8,000

Output totaled 40,000 units. Each unit requires three machine hours of effort. Material handling costs are allocated to the products based on direct materials cost. Design costs are allocated based on units produced.

- E 9.** The concepts below underlie activity-based systems such as ABM and JIT. Match each numbered concept to the related lettered element(s) of the JIT operating environment.

Basic Concepts

- Simple is better.
- The quality of the product is critical.
- The work environment must emphasize continuous improvement.
- Maintaining inventories wastes resources and may hide bad work.
- Any activity or function that does not add value to the product should be reduced or eliminated.
- Goods should be produced only when needed.
- Workers must be multiskilled and must participate in the improvement of efficiency and product quality.

Related Elements of the JIT Operating Environment

- Maintain minimum inventory levels.
- Develop pull-through production planning and scheduling.
- Purchase materials and produce products as needed, in smaller lot sizes.
- Perform quick, inexpensive machine setups.
- Create flexible manufacturing work cells.
- Develop a multiskilled work force.
- Maintain high levels of product quality.
- Enforce a system of effective preventive maintenance.
- Encourage continuous improvement in the work environment.

- E 10.** Identify which of the following exist in a traditional manufacturing environment and which exist in a JIT environment.

- Large amounts of inventory
- Complex manufacturing processes
- Multiskilled labor force
- Flexible work cells
- Push-through production methods
- Materials purchased in large lot sizes with few deliveries
- Infrequent setups

- E 11.** The cost categories in this list are common in a manufacturing and assembly operation:

LO 5 Elements of JIT

LO 5 JIT Versus Traditional Manufacturing Environments

LO 6 Direct Versus Indirect Costs

Direct materials	Operating supplies
Sheet steel	Small tools
Iron castings	Depreciation, plant
Assembly parts	Depreciation, machinery
Part 24RE6	Supervisory salaries
Part 15RF8	Electrical power
Direct labor	Insurance and taxes, plant
Engineering labor	President's salary
Indirect labor	Employee benefits

Identify each cost as either direct or indirect, assuming it was incurred in (1) a traditional manufacturing setting and (2) a JIT environment. State the reasons for any changes in classification.

LO 7 Work in Process Inventory

- E 12.** Nakai Products Co. installed a JIT work environment in its Shovel Division, and the system has been operating at near capacity for eight months. The division's accounting system was changed to combine direct labor and manufacturing overhead into a Conversion Costs account. The following transactions took place last week.

May 28 Ordered and received handles and sheet metal costing \$11,340.
 29 Direct labor costs incurred, \$5,400.
 29 Manufacturing overhead costs incurred, \$8,100.
 30 Completed shovels costing \$24,800.
 31 Sold shovels costing \$24,000.

Using backflush costing, calculate the ending balance in the Work in Process Inventory and the Finished Goods Inventory accounts.

LO 7 Backflush Costing

- E 13.** Trinidad Enterprises produces several varieties of digital alarm clocks. The company recently installed a just-in-time assembly process and uses backflush costing to record production costs. Manufacturing overhead is assigned using a rate of \$17 per assembly labor hour. There were no beginning inventories in March. During the month, the following operating data were generated:

Cost of direct materials purchased and used	\$53,200
Direct labor costs incurred	\$27,300
Manufacturing overhead costs assigned	?
Assembly hours worked	3,840 hours
Ending work in process inventory	\$1,050
Ending finished goods inventory	\$960

Using T accounts, show the flow of costs through the backflush costing system. What was the total cost of goods sold for March?

LO 8 ABM Versus JIT

- E 14.** Identify each of the following as a characteristic of ABM or JIT.

1. Uses backflush costing
2. Uses ABC to assign manufacturing overhead costs to the product cost
3. Integrates ABC with either job order or process costing systems
4. Reduces complexity by using work cells, standardizing parts, and reducing or eliminating inventories and nonvalue-adding production activities
5. Reorganizes activities so that they are performed within work cells

LO 8 ABM Versus JIT

- E 15.** Two managers are discussing their companies' activity-based systems. Tell which one uses ABM and which one uses JIT.

Manager 1: We are concerned with managing resources effectively by monitoring operating activities. All activities are analyzed, and the ones that do not add value are eliminated or reduced.

Manager 2: We are concerned with eliminating waste. Therefore, we operate in an environment in which the time to move, store, queue, and inspect materials and goods is greatly reduced. We have reduced inventories by purchasing and using materials only as needed.

PROBLEMS

LO 2 Value Chain and Process
LO 3 Value Analysis



- P 1.** Lindstrom Industries, Inc., produces a line of yard maintenance equipment for major retail store chains. Among the company's products are chain saws, lawn weed eaters, trimmers, and lawn mowers. These products are made to order in large quantities for each customer. The company has adopted an activity-based management philosophy, and the controller is in the process of developing an activity-based costing system. He has identified the following primary activities of the company.

Production scheduling	Materials moving
Product delivery	Production—assembly
Customer follow-up	Engineering design
Materials and parts purchasing	Product inspection
Materials storage	Processing areas clean-up
Materials inspection	Product marketing
Production—drilling	Building maintenance
Product packaging	Product sales
New product testing	Product rework
Finished goods storage	Production—grinding
Production—machine setup	Personnel services

REQUIRED

1. Identify the activities that are nonvalue-adding.
2. Assist the controller's process value analysis by grouping the value-adding activities into the activity areas of the value chain illustrated in Figure 2.
3. State whether each nonvalue-adding activity is necessary or unnecessary. Suggest how the controller could reduce or eliminate each unnecessary activity.

P 2.

Boudreau Products, Inc., produces a line of printers for wholesale distributors in the South. Shawl Company placed an order for 150 Model G printers, and Boudreau Products has just completed packaging the order. Before shipping the Shawl order, the controller has decided to ask for a unit cost analysis comparing costs determined using the traditional costing system with costs computed under the new activity-based costing system.

Direct materials, purchased parts, and production labor costs for the Shawl order are as follows:

Direct materials	\$17,552
Purchased parts	\$14,856
Direct labor hours	140
Average direct labor pay rate per hour	\$17

Other operating costs are as follows:

Traditional costing data:

Manufacturing overhead costs were assigned at a rate of 240 percent of direct labor cost.

Activity-based costing data:

Activity	Cost Driver	Activity Cost Rate	Activity Usage for Shawl Order
Engineering systems design	Engineering hours	\$28 per engineering hour	18 engineering hours
Setup	Number of setups	\$36 per setup	12 setups
Parts production	Machine hours	\$37 per machine hour	82 machine hours
Product assembly	Labor hours	\$42 per labor hour	36 labor hours
Packaging	Number of packages	\$28 per package	30 packages

Building occupancy-related costs are assigned at a rate of \$10 per machine hour.

1. Use the traditional costing approach to compute the total cost and the product unit cost of the Shawl order.
2. Using the cost hierarchy, identify each activity as unit level, batch level, product level, or facility level.
3. Prepare a bill of activities for the operating costs.
4. Use activity-based costing to compute the total cost and the product unit cost of the Shawl order.
5. What difference in the product unit cost of the Shawl order resulted from the shift to activity-based costing? Does the use of activity-based costing guarantee cost reduction for every order?

LO 4 ABM and Activity-Based Costing**REQUIRED**

LO 4 Activity Cost Rates

- P 3.** Green Company produces four versions of its model J17-21 bicycle seat in its San Diego plant. The four versions have different shapes but identical processing operations and production costs. During July, the following costs were incurred.

Direct materials:	
Leather	\$25,430
Metal frame	39,180
Bolts	3,010
Materials handling:	
Labor	8,232
Equipment depreciation	4,410
Electrical power	2,460
Maintenance	5,184
Direct labor:	
Machinists	13,230
Engineering design:	
Labor	4,116
Electrical power	1,176
Engineering overhead	7,644
Overhead:	
Equipment depreciation	7,056
Indirect labor	30,870
Supervision	17,640
Operating supplies	4,410
Electrical power	10,584
Repairs and maintenance	21,168
Building occupancy overhead	52,920

July's output totaled 29,400 units. Each unit requires three machine hours of effort. Materials handling costs are allocated to the products based on direct materials cost, engineering design costs are allocated based on units produced, and overhead is allocated based on machine hours.

During July, Job 142 was completed for 500 bicycle seats. The activity usage for job 142 was as follows.

Direct materials	\$1,150
Direct labor	225

REQUIRED

- Compute the following activity cost rates:
 - The materials handling cost rate
 - The engineering design cost rate
 - Overhead rate
- Prepare a bill of activities for Job 142.
- Use activity-based costing to compute the total cost and the product unit cost for Job 142.

LO 6 Classifying Costs

- P 4.** Riverwalk Company produces wooden toys. In December, Letty Hernando prepared the following list of costs in preparation for adopting a JIT operating environment.

Wood	\$3,200	Insurance, plant	\$ 324
Bolts	32	President's salary	4,000
Small tools	54	Engineering labor	2,700
Depreciation, plant	450	Utilities	1,250
Depreciation, machinery	275	Building occupancy	1,740
Direct labor	2,675	Supervision	2,686
Indirect labor	890	Operating supplies	254
Purchased parts	58	Repairs and maintenance	198
Materials handling	74	Employee benefits	2,654

REQUIRED

- Identify each cost as either direct or indirect, assuming a traditional manufacturing setting.
- Identify each cost as either direct or indirect, assuming a JIT environment.

3. Assume that the above costs for the JIT environment are those for the Toy Bridge work cell, where 1,250 toy bridges were completed in December. Compute the total direct cost and the direct cost per unit for the bridges produced.

LO 7 Backflush Costing



- P 5.** D & M Automotive Parts Co. produces 12 automotive body parts that are purchased by three automobile assembly companies in the United States. The Fender Work Cell is operated by four employees and involves a flexible manufacturing system with 14 work stations. The work cell produces automotive fenders that are completely detailed and ready to install when received by the customer. Just-in-time operating and costing procedures have been implemented since the work cell became operational three years ago. Manufacturing overhead is applied using a rate of \$26 per work cell hour used. All direct materials and purchased parts are used as they are received. Operating details for February for the Fender Work Cell are shown below.

Beginning work in process inventory	—
Beginning finished goods inventory	\$420
Cost of direct materials purchased on account and used	\$213,400
Cost of parts purchased on account and used	\$111,250
Direct labor costs incurred	\$26,450
Costs of goods completed during February	\$564,650
Manufacturing overhead costs assigned	?
Work cell hours used	8,260 work cell hours
Ending work in process inventory	\$1,210
Ending finished goods inventory	\$670

REQUIRED

- Using T accounts, show the flow of costs through a backflush costing system. (Note: In backflush costing, costs in beginning inventories remain in the accounts until the end of the period, when the accounts are adjusted to their ending balances.)
- Using T accounts, show the flow of costs through a traditional costing system.
- What was the total cost of goods sold for the month?

ALTERNATE PROBLEMS

LO 4 Activities and Activity-Based Costing



- P 6.** Mau Cellular Company, which has been in operation for six years, produces a line of cellular telephones. Many Maids, Ltd., placed an order for 80 cellular phones, and the order has just been completed. Mau recently shifted to an activity-based costing system. Stan Shea, the controller, is interested in finding out what impact the ABC system had on the Many Maids order. Direct materials, purchased parts, and production labor costs for the Many Maids order are as follows:

Direct materials	\$36,950	Direct labor hours	220
Purchased parts	21,100	Average direct labor pay rate per hour	\$15

Other operating costs are as follows:

Traditional costing data:

Manufacturing overhead costs were assigned at a rate of 270 percent of direct labor cost.

Activity-based costing data:

Activity	Cost Driver	Activity Cost Rate	Activity Usage for Many Maids Order
Electrical engineering design	Engineering hours	\$19 per engineering hour	32 engineering hours
Setup	Number of setups	\$29 per setup	11 setups
Parts production	Machine hours	\$26 per machine hour	134 machine hours
Product testing	Number of tests	\$32 per test	52 tests
Packaging	Number of packages	\$17 per package	22 packages

Building occupancy-related costs are assigned at a rate of \$9.80 per machine hour.

REQUIRED

1. Use the traditional costing approach to compute the total cost and the product unit cost of the Many Maids order.
2. Using the cost hierarchy, identify each activity as unit level, batch level, product level, or facility level.
3. Prepare a bill of activities for the operating costs.
4. Use activity-based costing to compute the total cost and the product unit cost of the Many Maids order.
5. What difference in the product unit cost of the Many Maids order resulted from the shift to activity-based costing? Does the use of activity-based costing guarantee cost reduction for every order?

LO 4 Activity Cost Rates

- P 7.** Benning Company produces aluminum skateboards in its Kansas City plant. The three models made by the company have minor differences but use identical processing operations and production costs. During June, the following costs were incurred:

Direct materials:

Aluminum frame	\$162,524
Bolts	3,876

Purchased parts:

Wheels	74,934
Decals	5,066

Materials handling (assigned based on direct materials cost):

Labor	17,068
Utilities	4,438
Maintenance	914
Depreciation	876

Direct labor:

Assembly line	46,080
---------------	--------

Setup (assigned based on number of setups):

Labor	6,385
Supplies	762
Overhead	3,953

Product testing (assigned based on number of tests):

Labor	2,765
Supplies	435

Building occupancy (assigned based on machine hours):

Insurance	5,767
Depreciation	2,452
Repairs and maintenance	3,781

June's output totaled 32,000 skateboards. Each board required 1.5 machine hours of effort. During June, Benning Company performed 370 setups and 64,000 product tests. A job for Executive Toys was completed for 1,000 skateboards that incurred costs of \$5,200 for direct materials, \$2,500 for purchased parts, and \$1,440 for direct labor. The job required 3 setups and 2,000 tests.

REQUIRED

1. Compute the following activity cost rates:
 - a. Materials handling cost rate
 - b. Setup cost rate
 - c. Product testing cost rate
 - d. Building occupancy cost rate
2. Prepare a bill of activities for the Executive Toys job.
3. Use activity-based costing to compute the total cost and the product unit cost of the Executive Toys job.

LO 7 Backflush Costing

- P 8.** Reilly Corp. produces metal fasteners using six work cells, one for each of the company's product lines. Just-in-time operations and costing methods were implemented two years ago. Manufacturing overhead is assigned using a rate of \$14 per machine hour for the Machine Screw Work Cell. There were no beginning inventories on April 1. All direct materials and purchased parts are used as they are received. Operating details for April for the Machine Screw Work Cell are as follows.

Cost of direct materials purchased on account and used	\$104,500
Cost of parts purchased on account and used	\$78,900
Direct labor costs incurred	\$39,000
Costs of goods completed during April	\$392,540
Manufacturing overhead costs assigned	?
Machine hours used	12,220 machine hours
Ending work in process inventory	\$940
Ending finished goods inventory	\$1,020

REQUIRED

1. Using T accounts, show the flow of costs through a backflush costing system.
2. Using T accounts, show the flow of costs through a traditional costing system.
3. What was the total cost of goods sold for the month?

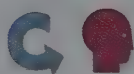
EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

SD 1.

LO 5 JIT in a Service Business



The initiation banquet for new members of your business club is being held at an excellent restaurant. You are sitting next to two marketing majors. In discussing the accounting course they are taking, they mention that they are having difficulty understanding the just-in-time (JIT) philosophy. They have read that a company's JIT operating system contains elements that support the concepts of simplicity, continuous improvement, waste reduction, timeliness, and efficiency. They realize that in order to understand JIT in a complex manufacturing environment, they must first understand JIT in a simpler context. They ask you to explain the philosophy and provide an example.

Briefly explain the just-in-time philosophy. Apply the elements of a JIT operating system presented in this chapter to the restaurant where your banquet is being held. Do you believe the JIT philosophy applies in all restaurant operations? Explain.

SD 2.

LO 3 Adding Value



Digital marketplaces are changing the way companies do business. According to the article "Time for Zero Time," a new business model called zero time is emerging.⁶ In this model, time is the primary focus that drives everything else in the organization. In zero time, instantaneous Internet access to relevant information allows a company to add value for customers at every point along its value chain—from marketing to research and development to purchasing to processing to shipping to customer relations.

1. Identify and comment on the primary focus of previous business models, such as job order or process costing.
2. Speculate about how focusing on time will add value for customers throughout an organization's value chain.

Ethical Dilemma

SD 3.

LO 5 Ethics and JIT Implementation

For almost a year, *Traki Company* has been changing its manufacturing process from a traditional to a JIT approach. Management has asked for employee assistance in the transition and has offered bonuses for suggestions that cut time from the production



Communication



Critical Thinking



Ethics



Group Activity



Hot Links to Real Companies



International



Internet



Memo



Spreadsheet



operation. Deb Hinds and Jack Snow each identified a time-saving opportunity and, independently, turned in their suggestions to their manager, Randall Soder.

When Soder sent the suggestions to the vice president of production, they were inadvertently identified as being Soder's own. After careful analysis, the company's Production Review Committee decided that the two suggestions were worthy of reward and voted a large bonus to Soder. When notified by the vice president, Soder could not bring himself to identify the true authors of the suggestions.

When Hinds and Snow heard about Soder's ill-gained bonus, they were very upset and confronted him with their grievance. He told them that he needed the recognition to be eligible for an upcoming promotion and promised that if they kept quiet about the matter, he would make sure that they both received significant raises. Prepare written responses so that you can discuss the following questions in class.

1. Should Hinds and Snow keep quiet? What other options are open to them?
2. Given that Soder committed a fraudulent act, how should he have dealt with the complaint of Hinds and Snow?

Research Activity

SD 4.

LO 6 Just-in-Time Production



Many large, multinational companies, as well as many smaller companies, have recently installed automated just-in-time production processes to compete for new domestic and foreign business. Locate an article about a company that has recently installed a JIT system. Conduct your search using the company annual reports in your campus library, the business section of your local newspaper, *The Wall Street Journal*, or the Needles Accounting Resource Center web site at <http://college.hmco.com>.

Choose a source that describes the changes the company made within its plant to increase product quality and to compete as a world-class manufacturer. Prepare a one-page description of those changes. Include in your report the name of the company, its geographic location, the name of the chief executive officer and/or president, and the dollar amount of the company's total sales for the most recent year, if stated. Be prepared to present your findings to your classmates.

Decision-Making Practice

SD 5.

LO 3 Activities, Cost Drivers, LO 5 and JIT LO 6



Atlanta, Georgia, is the home of the *Sable Corporation*. Fifteen years ago Bruce Sable teamed up with 10 financial supporters and created a roller skate manufacturing company. Company design people soon turned the roller skate idea into a riding skateboard. Twelve years and more than 4 million skateboards later, Sable Corporation finds itself an industry leader in both volume and quality. In order to retain market share, Sable Corporation has decided to automate its manufacturing process. Flexible manufacturing systems have been ordered for the wheel assembly and the board shaping lines. Manual operations will be retained for the board decorating line because some hand painting is involved. All operations will be converted to a just-in-time environment.

You have been called in as a consultant to Sable, who wants some idea of the impact of the new JIT approach on the company's product costing practices.

1. Summarize the elements of a JIT environment.
2. What changes in product costing should be anticipated when the new automated systems are installed?
3. What are some cost drivers that the company should employ? In what situations?

MANAGERIAL REPORTING AND ANALYSIS

Interpreting Management Reports

MRA T.

LO 3 ABC and Selling and LO 4 Administrative Expenses

Sally Star, the owner of *Star Bakery*, wants to know the profitability of each of the bakery's customer groups. She is especially interested in the State Prisons customer group, which is one of Star Bakery's largest customer groups. Currently, the bakery is

Star Bakery
Income Statement for State Prisons Customer Group
For the Year Ending December 31, 20x1

Sales (\$5 per case × 50,000 cases)	\$250,000
Cost of goods sold (\$3.50 per case × 50,000 cases)	175,000
Gross margin	\$ 75,000
Less: Selling and administrative activities costs	

Activity	Activity Cost Rate	Cost Driver Level	Activity Cost
Make sales calls	\$60 per sales call	60 sales calls	\$ 3,600
Prepare sales orders	\$10 per sales order	900 sales orders	9,000
Handle inquiries	\$5 per minute	1,000 minutes	5,000
Ship products	\$1 per case sold	50,000 cases	50,000
Process invoices	\$20 per invoice	950 invoices	19,000
Process credit	\$20 per notice	40 notices	800
Process billings and collections	\$7 per billing	1,050 billings	<u>7,350</u>
Total selling and administrative activity costs			<u>94,750</u>
Net income (loss) contributed by state prisons			<u><u>\$(19,750)</u></u>



selling doughnuts and snack foods to ten state prisons in three states. The controller has prepared the income statement shown above for the State Prisons customer group. The controller has also provided information about selling and administrative activities for customer groups that have similar characteristics. For 20x1, the planned activity cost rates and the annual cost driver levels for each selling and administrative activity are as follows:

Activity	Activity Cost Rate	Planned Annual Cost Driver Level
Make sales calls	\$60 per sales call	59 sales calls
Prepare sales orders	\$10 per sales order	850 sales orders
Handle inquiries	\$5.10 per minute	1,000 minutes
Ship products	\$.60 per case sold	50,000 cases
Process invoices	\$1 per invoice	500 invoices
Process credit	\$10 per notice	5 notices
Process billings and collections	\$4 per billing	600 billings

You have been called in as a consultant on the State Prisons customer group.

REQUIRED

1. Calculate the planned activity cost for each activity.
2. Calculate the differences between the planned activity cost and the State Prisons customer group's activity costs for 20x1.
3. From your evaluation of the differences calculated in 2 and your review of the income statement, identify the nonvalue-adding activities and state which selling and administrative activities should be examined.
4. What actions might the company take to reduce the costs of nonvalue-adding selling and administrative activities?



Group Activity: Provide data for 1 and 2 to groups and ask them to discuss and answer 3 and 4.

LO 5 Manufacturing Processes



MRA 2.

Formulating Management Reports

Classic Clubs, Inc., manufactures professional golf clubs. Demand has been so great that the company built a special plant that makes only custom-crafted clubs. The clubs are shaped by machines but vary according to the customer's sex, height, weight, and arm length. Ten basic sets of clubs are produced, five for females and five for males. Slight variations in machine setup produce the differences in the club weights and lengths. In the past six months, several problems have developed. Even though one computer numerically controlled machine is used in the manufacturing process, the company's backlog is growing rapidly. Customers are complaining that delivery is too slow. Quality is declining because clubs are being pushed through production without proper inspection. Working capital is tied up in excessive amounts of inventory and storage space. Workers are complaining about the pressure to produce the backlogged orders. Machine breakdowns are increasing. Production control reports are not useful because they are not timely and contain irrelevant information. The company's profitability and cash flow are suffering.

Classic Clubs, Inc., has hired you as a consultant to define the problem and suggest a possible solution to the current dilemma. Denise Rodemeyer, the president, asks that you complete your work within a month so that she can prepare an action plan to present to the board of directors at the mid-year board meeting.

REQUIRED

1. In memo form, prepare a response to Rodemeyer. Recommend specific changes in the manufacturing processes.
2. To help you prepare this report, answer the following questions.
 - a. What kinds of information do you need to prepare this report?
 - b. Why is this information relevant?
 - c. Where would you go to obtain this information (sources)?
 - d. When would you want to obtain this information?

International Company

MRA 3.

LO 4 ABM and ABC in a Service Business



Kendle and Watson, a CPA firm, has provided audit, tax, and management advisory services to businesses in the London area for over 50 years. Recently, the firm decided to use ABM and activity-based costing to assign its overhead costs to those service functions. Bellamy Kendle is interested in seeing the difference in the average cost per audit job between the traditional and the activity-based costing approaches. The following information has been provided to assist in the comparison.

Total direct labor costs	£400,000
Other direct costs	120,000
Total direct costs	<u>£520,000</u>

Overhead costs are as follows:

Traditional costing data:

Overhead costs were assigned at a rate of 120 percent of direct labor costs.

Activity-based costing data:

Activity	Cost Driver	Activity Cost Rate	Activity Usage for Audit Function
Professional development	Number of employees	£2,000 per employee	50 employees
Administration	Number of jobs	£1,000 per job	50 jobs
Client development	Number of new clients	£5,000 per new client	29 new clients

REQUIRED

1. Using direct labor cost as the cost driver, calculate the total costs for the audit function. What is the average cost per job?
2. Using activity-based costing to assign overhead, calculate the total costs for the audit function. What is the average cost per job?

3. Calculate the difference in total costs between the two approaches. Why would activity-based costing be the better approach to assigning overhead to the audit function?

Excel Spreadsheet Analysis

MRA 4.

Refer to the income statement for the State Prisons customer group for the year ending December 31, 20x1, in MRA 1. Sally Star, the owner of *Star Bakery*, is in the process of budgeting net income for 20x2. She has asked the controller to prepare a budgeted income statement for the State Prisons customer group. Sally estimates that the selling price per case, the number of cases sold, the cost of goods sold per case, and the activity costs for making sales calls, preparing sales orders, and handling inquiries will remain the same for 20x2. She has contracted with a new freight company to ship the 50,000 cases at \$.60 per case sold. She has also analyzed the processes for invoicing, reviewing credit, billing, and collecting and has decided it would be less expensive for a customer service agency to do the work. The agency will charge the bakery 1.5 percent of the total sales revenue.

Using an Excel spreadsheet:

1. Prepare a budgeted income statement for the State Prisons customer group for the year ending December 31, 20x2.
2. Refer to the information in MRA 1. Assuming the planned activity cost rate and planned annual cost driver level for each selling and administrative activity remain the same in 20x2, calculate the planned activity cost for each activity.
3. Calculate the differences between the planned activity costs and the State Prisons customer group's activity costs for 20x2.
4. Evaluate the results of changing freight companies and outsourcing the customer service activities.

Internet Case

MRA 5.

New words enter our vocabulary on a daily basis. Business conversations now commonly include such terms as *e-mail*, *sync*, *24/7*, *JIT*, and *ABC*. One term introduced in this chapter was *zero time*. Zero time, as first discussed in SD 2, is the ability to react instantaneously to customers to provide customer value whenever and wherever possible. Do a quick search on the Web using *zero time*. What products, services, or organizations do you find? List three of your findings and do a brief summary of them to share in class.⁷

LO 3 ABC in Planning and LO 4 Control



REQUIRED

LO 2 Zero Time and LO 3 the Value Chain



ENDNOTES

1. Scott Kirsner, "Venture Vérité, United Parcel Service," *Wired*, September 1999.
2. Gary Cokins, "Learning to Love ABC," *Journal of Accountancy*, August 1999.
3. Gina Imperato, "Harley Shifts Gears," *Fast Company*, June–July 1997.
4. George Anders, "Postal Service Soon to Let Two Firms Nationally Sell Computer-Made Stamps," *The Wall Street Journal*, July 19, 1999.
5. Alexander Kogan, Ephraim F. Sudit, and Miklos A. Visarhelyi, "Management Accounting in the Era of Electronic Commerce," *Management Accounting*, Institute of Management Accountants, September 1997.
6. Gina Imperato, "Time for Zero Time," *Net Company*, Fall 1999.
7. Gina Imperato, "first.site," *Net Company*, Fall 1999.

Cost Behavior Analysis

LEARNING OBJECTIVES

- 1** Define *cost behavior* and explain how managers use this concept in the management cycle.
- 2** Identify specific types of variable and fixed cost behavior, and discuss how operating capacity and relevant range relate to cost behavior.
- 3** Define *mixed cost*, and use the high-low method to separate the variable and fixed components of a mixed cost.
- 4** Define *cost-volume-profit analysis* and discuss how managers use this analysis.
- 5** Compute a breakeven point in units of output and in sales dollars, and prepare a breakeven graph.
- 6** Define *contribution margin* and use the concept to determine a company's breakeven point for a single product and for multiple products.
- 7** Apply cost-volume-profit analysis to estimated levels of future sales and to changes in costs and selling prices.
- 8** Apply cost-volume-profit analysis to a service business.



DECISION POINT: A MANAGER'S FOCUS



Cummins Engine Company, Inc. Cummins Engine

Company, Inc., is a manufacturing company whose main office is located in Columbus, Indiana.¹ Cummins facilities in the United States, Mexico, and China manufacture diesel engines and other parts for large trucks. The trucking industry, in which Cummins operates, is a very cyclical industry. This means that the number of engines that are made and sold varies greatly from year to year depending on whether the economy is strong or weak. How does the variability in the demand for Cummins's engines affect management's planning for profitability?

Cummins's management must carefully consider the behavior of the many costs of making engines and determine a selling price that will take into account the variability of demand. For example, the total cost of direct materials, such as steel, and direct labor will vary based on the number of engines produced in any one year. The costs of direct materials and direct labor are roughly the same for each engine the company makes. In contrast, the total cost of operating the factories and manufacturing equipment used in making the engines will not change significantly from year to year in response to the number of engines produced. However, the amount of those costs applied to each engine will vary depending on the number of engines produced. To project the profitability of a particular year, management must take into account both the selling price and the estimated production and sales of engines and the effects those estimates have on the unit cost of the engines. This chapter focuses on the analysis of cost behavior and its role in achieving profitability.

Cost Behavior Patterns and the Management Cycle

OBJECTIVE

1 Define *cost behavior* and explain how managers use this concept in the management cycle

The expectation that an organization's management will generate income for its owners and maintain liquidity for its creditors requires managers to find ways to make good decisions. One common way of making good decisions is to use cost behavior to analyze alternative courses of action. **Cost behavior** is the way costs respond to changes in volume or activity. Some costs vary with volume or operating activity; others remain fixed as volume changes. Between those two extremes are costs that exhibit characteristics of each type.

Uses of Cost Behavior in the Management Cycle

An understanding of cost behavior is extremely helpful as managers move through the planning, executing, reviewing, and reporting stages of the management cycle, as shown in Figure 1.



PLANNING In the planning stage, managers want to know how many units must be sold to cover all costs or to generate a targeted amount of profit, or operating income. Managers want to know how changes in planned operating, investing, or financing activities will affect operating income. As German sports shoe manufacturer Adidas completed the acquisition of Salomon SA, a French ski and sporting goods maker, its management began to estimate income from future operations. They used cost behavior to estimate how the addition of new lines of sporting equipment, such as Salomon skis and snowboards, Taylor Made golf clubs, and Mavic cycling equipment, would contribute to the organization's operating income.



Car manufacturers, such as Chrysler, also use cost behavior in the planning stage to decide how to change the output of trucks and cars to meet changing sales demand. If increased demand for trucks suggests the need to increase truck production and decrease car production, management can use cost behavior analysis to estimate the changes in operating income for those product lines. Because the truck segment is more profitable for Chrysler, the company's net income should increase if truck production is increased.

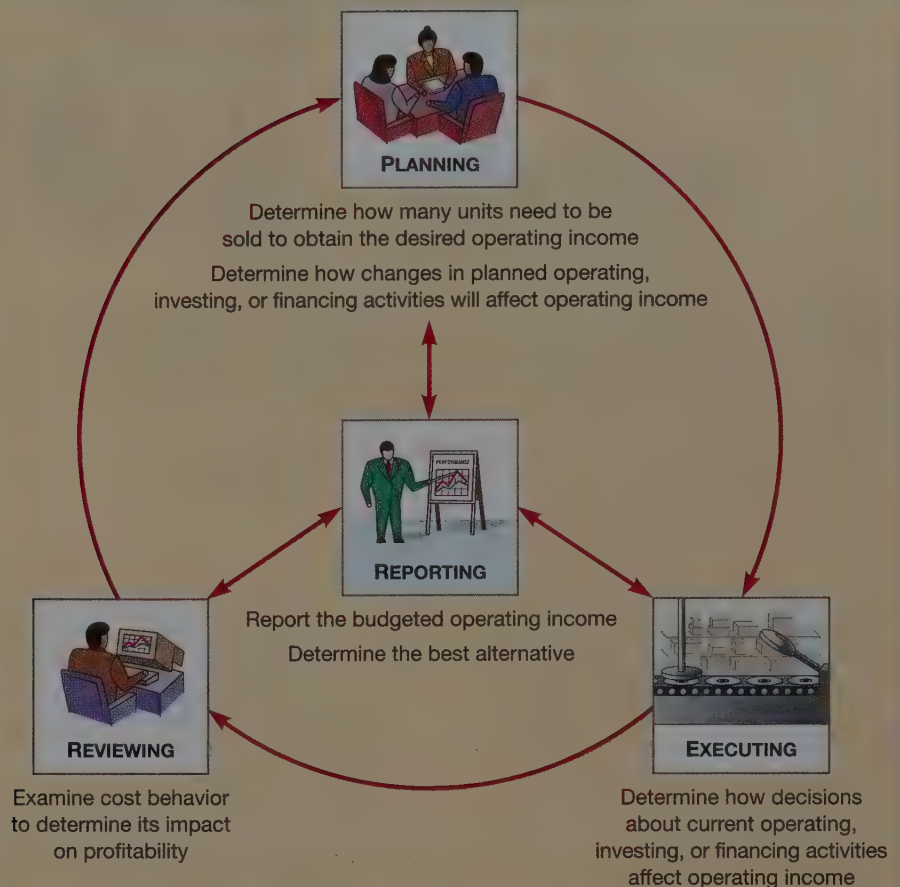


EXECUTING Managers use information about cost behavior in almost every decision they make. For example, managers at Cummins Engine must understand the changes in income that can result from a decision to buy new, more productive manufacturing equipment or to launch an advertising campaign to promote a new series of engines. Throughout the executing stage of the management cycle, managers must understand cost behavior to determine the impact of their decisions on operating income.



REVIEWING AND REPORTING Managers at Adidas, Chrysler, and Cummins Engine also need to understand cost behavior when reviewing operations and preparing reports. Variable costing income statements are commonly used to analyze how changes in cost and sales affect the profitability of product lines, sales territories, customers, departments, or other segments. Other reports based on cost behavior are used when deciding whether to eliminate a product line, accept a special order, or contract with another company to provide services previously performed internally.

Figure 1
The Use of Cost Behavior in the
Management Cycle



Our discussion in this chapter will focus primarily on cost behavior as it relates to production. But cost behavior can also be observed in other activities. For example, increases in the number of shipments affect shipping costs; the number of units sold or total sales revenue affects the cost of sales commissions; and the number of customers billed or the number of hours to bill affects total billing costs. Costs behave in much the same way in service organizations as they do in manufacturing organizations. We look specifically at the costs of service organizations later in the chapter.

The Behavior of Variable Costs

OBJECTIVE

2 Identify specific types of variable and fixed cost behavior, and discuss how operating capacity and relevant range relate to cost behavior

Total costs that change in direct proportion to changes in productive output (or any other measure of volume) are called **variable costs**. To explore how variable costs work, consider tire costs for Land Rover, a maker of off-road vehicles. Each new vehicle has four tires, and each tire costs \$48. The total cost of tires, then, is \$192 for one vehicle, \$384 for two, \$576 for three, \$768 for four, \$960 for five, \$1,920 for ten, and \$19,200 for one hundred. In the production of off-road vehicles, the total cost of tires is a variable cost. On a per-unit basis, however, a variable cost remains constant. In this case, the cost of tires per vehicle is \$192 whether the auto maker produces one vehicle or one hundred vehicles. True, the cost of tires varies depending on the number purchased and whether discounts are available for purchases of large quantities. But once the purchase has been made, the cost per tire is established. Figure 2 illustrates other examples of variable costs. All of those



Costs	Manufacturing Company— Desk Manufacturer	Merchandising Company— Department Store	Service Company—Bank
VARIABLE	Direct materials Direct labor (hourly) Indirect labor (hourly) Operating supplies Small tools	Merchandise to sell Sales commissions Shelf stockers (hourly)	Computer equipment leasing (based on usage) Computer operators (hourly) Operating supplies Data storage disks
FIXED	Depreciation, machinery and building Insurance premiums Labor (salaried) Supervisory salaries Property taxes	Depreciation, building Insurance premiums Buyers (salaried) Supervisory salaries Property taxes (on equipment and building)	Depreciation, furniture and fixtures Insurance premiums Salaries: Programmers Systems designers Bank administrators Rent, buildings
MIXED	Electrical power Telephone Heat	Electrical power Telephone Heat	Electrical power Telephone Heat

Figure 2
Examples of Variable, Fixed,
and Mixed Costs

costs—whether incurred by a manufacturer, a service business, or a merchandiser—are variable based on either productive output or total sales.

OPERATING CAPACITY Because variable costs increase or decrease in direct proportion to volume or output, it is important to know an organization's operating capacity. **Operating capacity** is the upper limit of an organization's productive output capability, given its existing resources. It describes just what an organization can accomplish in a given time period. Operating capacity can be expressed in several ways, including total labor hours, total machine hours, and total units of output. Any increase in volume or activity over operating capacity requires additional expenditures for buildings, machinery, personnel, and operations. In our discussion of cost behavior patterns, we assume that operating capacity is constant and that all activity occurs within the limits of current operating capacity. Cost behavior patterns can change when additional operating capacity is added.

There are three common measures, or types, of operating capacity: theoretical, or ideal, capacity; practical capacity; and normal capacity. **Theoretical (ideal) capacity** is the maximum productive output for a given period, assuming that all machinery and equipment is operating at optimum speed, without interruption. Theoretical capacity is useful in estimating maximum production levels, but an organization never operates at ideal capacity. In fact, the concept had little relation to actual operations until the advent of the just-in-time operating environment.

The concept that drives the just-in-time environment is the continuous improvement of operations, with the long-term goal of approaching ideal capacity.

Practical capacity is theoretical capacity reduced by normal and expected work stoppages. Production is interrupted by machine breakdowns and downtime for retooling, repairs and maintenance, and employees' work breaks. Such normal interruptions and the resulting reductions in output are considered when measuring practical capacity.

Most organizations do not operate at either theoretical or practical capacity. Both measures include **excess capacity**, machinery and equipment kept on standby. This extra equipment is used when regular equipment is being repaired. Also, during a slow season, a company may use only part of its equipment, or it may work just one or two shifts instead of around the clock. Because it is necessary to consider so many different circumstances, managers often use a measure called normal capacity, rather than practical capacity, when planning operations. **Normal capacity** is the average annual level of operating capacity needed to meet expected sales demand. The sales demand figure is adjusted for seasonal changes and industry and economic cycles. Therefore, normal capacity is a realistic measure of what an organization is likely to produce, not what it can produce.

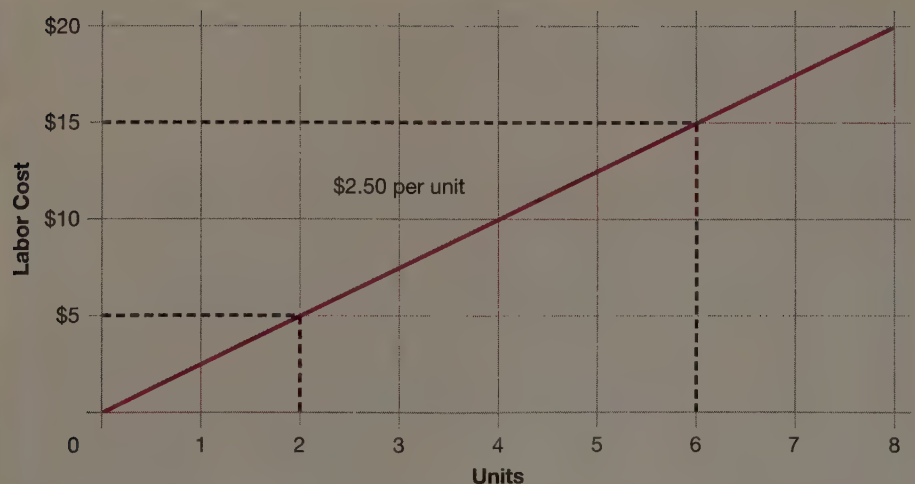
Each variable cost should be related to an appropriate measure of capacity, but in many cases, more than one measure of capacity applies. Operating costs can be related to machine hours used or total units produced. Sales commissions, on the other hand, usually vary in direct proportion to total sales dollars.

There are two reasons for carefully selecting the basis for measuring the activity of variable costs. First, an appropriate activity base simplifies cost planning and control. Second, the management accountant must combine (aggregate) many variable costs with the same activity base so that the costs can be analyzed in a reasonable way. Such aggregation also provides information that allows management to predict future costs.

The general guide for selecting an activity base is to relate costs to their most logical or causal factor. For example, machinery setup costs should be considered variable in relation to the number of setups needed for a particular job. This will allow machinery setup costs to be budgeted and controlled more effectively.

LINEAR RELATIONSHIPS AND THE RELEVANT RANGE The traditional definition of a variable cost assumes that there is a linear relationship between cost and volume, that costs go up or down as volume increases or decreases. You saw that relationship in our tire example earlier. Figure 3 shows another linear relationship.

Figure 3
A Common Variable Cost
Behavior Pattern: A Linear
Relationship



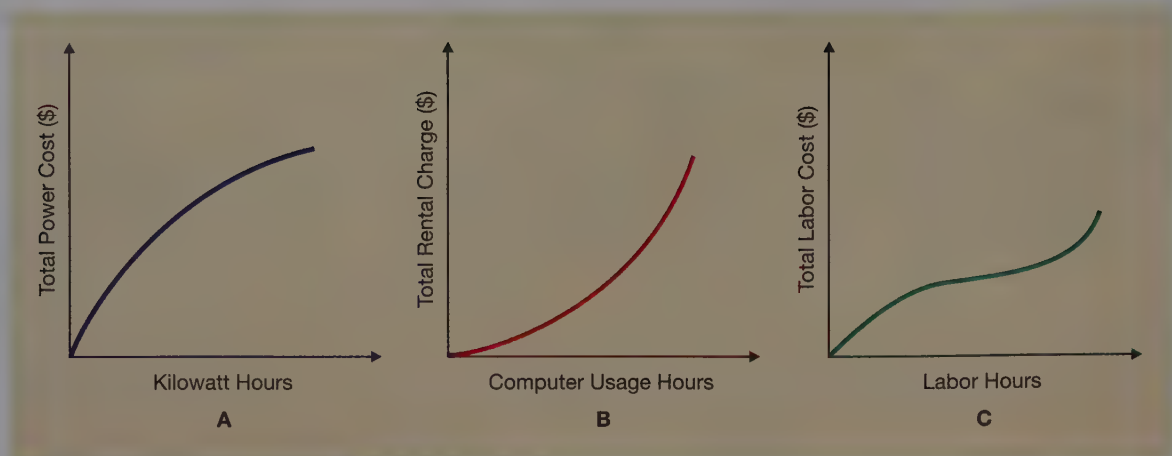


Figure 4
Other Variable Cost Behavior
Patterns: Nonlinear
Relationships

There, each unit of output requires \$2.50 of labor cost. Total labor costs grow in direct proportion to the increase in units of output: For two units, total labor costs are \$5.00; for six units, the organization incurs \$15.00 in labor costs.

Many costs, however, vary with operating activity in a nonlinear fashion. In Figure 4, graph A shows the behavior of power costs as usage increases and the unit cost of power consumption falls. Graph B shows the behavior of rental costs when each additional hour of computer usage costs more than the previous hour. And graph C shows how labor costs vary as efficiency increases and decreases. These three nonlinear cost patterns are variable in nature, but they differ from the straight-line variable cost pattern shown in Figure 3.

Variable costs with linear relationships to a volume measure are easy to analyze and project for cost planning and control. Nonlinear variable costs are not easy to use. But all costs must be included in an analysis if the results are to be useful to management. To simplify cost analysis procedures and make variable costs easier to use, accountants have developed a method of converting nonlinear variable costs into linear variable costs. This method is called *linear approximation* and relies upon the concept of relevant range. **Relevant range** is the span of activity in which a company expects to operate. Within that range, it is assumed that both total fixed costs and per-unit variable costs are constant. Under that assumption, many nonlinear costs can be estimated using the straight-line linear approximation approach illustrated in Figure 5. Those estimated costs can then be treated as part of the other variable costs.

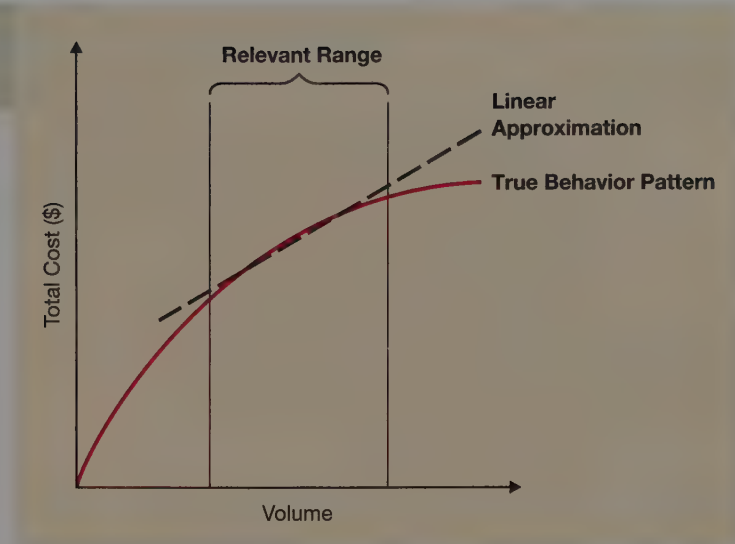
A linear approximation of a nonlinear variable cost is not a precise measure, but it allows the inclusion of nonlinear variable costs in cost behavior analysis, and the loss of accuracy is usually not significant. The goal is to help management estimate costs and prepare budgets, and linear approximation helps accomplish that goal.

The Behavior of Fixed Costs

Fixed costs behave very differently from variable costs. **Fixed costs** are total costs that remain constant within a relevant range of volume or activity. Remember that a relevant range of activity is the range in which actual operations are likely to occur.

Look back at Figure 2 for examples of fixed costs. The desk manufacturer, the department store, and the bank all incur depreciation costs and fixed annual insur-

Figure 5
The Relevant Range and Linear Approximation



ance premiums. In addition, all salaried personnel have fixed earnings for a particular period. The desk manufacturer and the department store own their buildings and must pay annual property taxes. The bank, on the other hand, pays an annual fixed rental charge for the use of its building.

As the examples in Figure 2 suggest, a particular time period is identified when discussing fixed costs because, according to economic theory, all costs tend to be variable in the long run. A change in plant capacity, machinery, labor requirements, or other production factors causes fixed costs to increase or decrease. Thus, a cost is fixed only within a limited time period. For planning purposes, management usually considers a one-year time period, and fixed costs are expected to be constant within that period.

Of course, fixed costs change when activity exceeds the relevant range. For example, assume that a local manufacturing organization needs one supervisor for an eight-hour work shift. Production can range from zero to 500,000 units per month per shift; the relevant range, then, is from zero to 500,000 units. The supervisor's salary is \$4,000 per month. The cost behavior analysis is as follows:

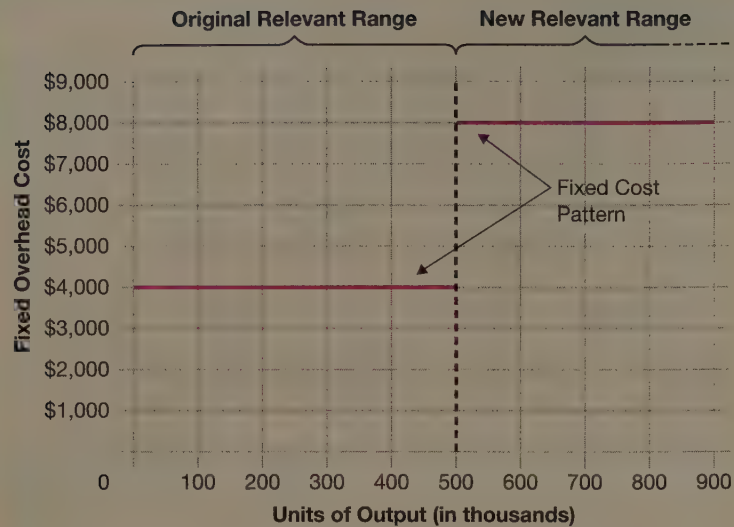
Units of Output per Month	Total Supervisory Salaries per Month
0–500,000	\$4,000
Over 500,000–1,000,000	\$8,000

If a maximum of 500,000 units can be produced per month per shift, any output above 500,000 units would require another work shift and another supervisor. Like all fixed costs, the new fixed cost remains constant in total within the new relevant range.

What about unit costs? Fixed costs per unit change as volume increases or decreases. *Unit fixed costs vary inversely with activity or volume.* On a per-unit basis, fixed costs go down as volume goes up. That pattern holds true as long as the firm is operating within the relevant range of activity. Look at how supervisory costs per unit fall as the volume of activity increases within the relevant range.

Volume of Activity	Cost per Unit
100,000 units	$\$4,000 \div 100,000 = \0.0400
300,000 units	$\$4,000 \div 300,000 = \0.0133
500,000 units	$\$4,000 \div 500,000 = \0.0080
600,000 units	$\$8,000 \div 600,000 = \0.0133

Figure 6
A Common Fixed Cost Behavior
Pattern



The per-unit cost increases to \$.0133 at the 600,000-unit level because that activity level is above the relevant range, which means another shift must be added and another supervisor must be hired.

Figure 6 shows this behavior pattern. The fixed supervisory costs for the first 500,000 units of production are \$4,000. Those costs hold steady at \$4,000 for any level of output within the relevant range. But if output goes above 500,000 units, another supervisor must be hired, pushing fixed supervisory costs to \$8,000.

Mixed Costs

OBJECTIVE

3 Define *mixed cost*, and use the high-low method to separate the variable and fixed components of a mixed cost

Some costs cannot be classified as either variable or fixed. A **mixed cost** has both variable and fixed cost components. Part of the cost changes with volume or usage, and part of the cost is fixed over the period. Telephone cost is an example. Monthly telephone cost includes charges for long-distance calls plus a service charge and charges for extra telephones. The long-distance charges are variable because they depend on the amount of use; the service charge and the cost of the additional telephones are fixed costs.

EXAMPLES OF MIXED COSTS

Many costs have both variable and fixed components. Utilities costs often fall into this category. Like telephone costs, the costs of

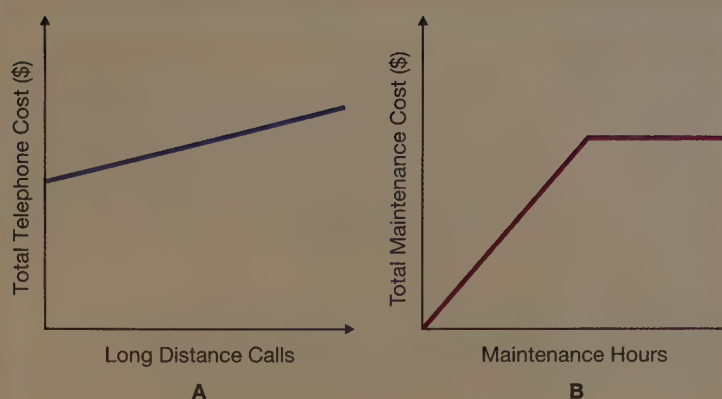
FOCUS ON BUSINESS TECHNOLOGY



Airline companies, such as United, American, and Delta, use their unique cost structure to make pricing decisions that will increase profitability. Airlines have a high proportion of fixed costs relative to the variable costs associated with an additional passenger. In other words, it does not cost much extra to

include an additional passenger on a flight as long as a seat is available. In principle, the objective is simple: Keep the prices high on seats that will sell anyway and reduce prices on seats that are less likely to sell, with the goal of filling as many seats as possible on every flight. In practice, this is a very complex process; it is made possible by very sophisticated software that often results in minute-to-minute price changes. After years of development, the airlines have refined the system so that they can increase their profitability by increasing the revenue from each flight.

Figure 7
Behavior Patterns of Mixed Costs



electricity and gas heat normally consist of a fixed base amount and additional charges related to usage. Figure 7 shows just two of the many behavior patterns of mixed costs. Graph A depicts the total telephone cost for an organization. The monthly bill begins with a fixed charge for the service and increases as long-distance calls are made. Graph B illustrates a special contractual arrangement. In Graph B, the annual cost of equipment maintenance that is provided by an outside company increases for each maintenance hour worked, up to a maximum amount per period. After the maximum is reached, additional maintenance is done at no cost.

THE HIGH-LOW METHOD OF SEPARATING COSTS For cost planning and control, mixed costs must be divided into their respective variable and fixed components. The separate components can then be grouped with other variable and fixed costs for analysis. When there is doubt about the behavior pattern of a particular cost, especially a mixed cost, it helps to plot past costs and related measures of volume in a scatter diagram. A **scatter diagram** is a chart of plotted points that helps determine if there is a linear relationship between a cost item and its related activity measure. It is a form of linear approximation. If the diagram suggests that a linear relationship exists, a cost line can be imposed on the data by either visual means or statistical analysis.

For example, last year, the Evelio Corporation's Winter Park Division incurred the following machine hours and electricity costs.

Month	Machine Hours	Electricity Costs
January	6,250	\$ 24,000
February	6,300	24,200
March	6,350	24,350
April	6,400	24,600
May	6,300	24,400
June	6,200	24,300
July	6,100	23,900
August	6,050	23,600
September	6,150	23,950
October	6,250	24,100
November	6,350	24,400
December	6,450	24,700
Totals	<u>75,150</u>	<u>\$290,500</u>

Figure 8
Scatter Diagram of Machine Hours
and Electricity Costs

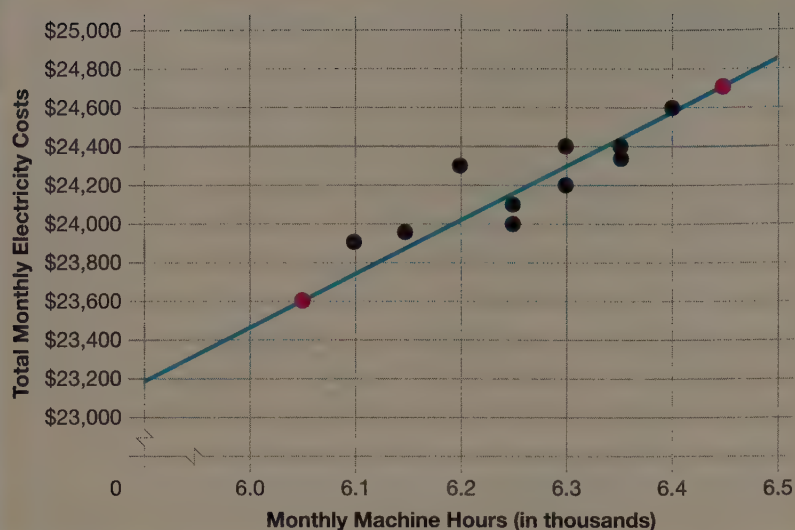


Figure 8 shows a scatter diagram of those data. The diagram suggests a linear relationship between machine hours and the cost of electricity. To determine the variable and fixed components of this mixed cost, we apply the **high-low method**, a common, three-step approach to separating variable and fixed costs.

Step 1: Calculate the variable cost per activity base.

Select the periods of highest and lowest activity within the accounting period. In our example, the Winter Park Division experienced its highest machine-hour activity in December and its lowest machine-hour activity in August. Find the difference between the highest and lowest amounts for both the machine hours and their related electricity costs.

Volume	Month	Activity Level	Cost
Highest	December	6,450 machine hours	\$24,700
Lowest	August	6,050 machine hours	23,600
Difference		400 machine hours	\$ 1,100

To determine the variable cost per machine hour, divide the difference in cost by the difference in machine hours.

$$\begin{aligned}\text{Variable Cost per Machine Hour} &= \$1,100 \div 400 \text{ Machine Hours} \\ &= \$2.75 \text{ per Machine Hour}\end{aligned}$$

Step 2: Calculate the total fixed costs.

Compute total fixed costs for a month by selecting the information from the month with either the highest or the lowest volume. Let's select the month with the highest volume.

$$\text{Total Fixed Costs} = \text{Total Costs} - \text{Total Variable Costs}$$

$$\text{Total Fixed Costs for December} = \$24,700.00 - (6,450 \times \$2.75) = \$6,962.50$$

You can check your answer by recalculating total fixed costs using the month with the lowest activity. Total fixed costs will be the same.

$$\text{Total Fixed Costs for August} = \$23,600.00 - (6,050 \times \$2.75) = \$6,962.50$$

Step 3: Calculate the formula to estimate the total costs within the relevant range.

$$\text{Total Cost per Month} = \$6,962.50 + \$2.75 \text{ per Machine Hour}$$

Remember that the cost formula will work only within the relevant range. In this example, the formula would work for amounts between 6,050 machine hours and 6,450 machine hours. To estimate the electricity costs for machine hours outside the relevant range (in this case, below 6,050 machine hours or above 6,450 machine hours), a new cost formula must be calculated.

Cost-Volume-Profit Analysis

OBJECTIVE

4 Define *cost-volume-profit analysis* and discuss how managers use this analysis



One business of Sony Records is the production and distribution of popular compact disks (CDs). Producing CDs is a complex process that requires the hiring and organizing of hundreds of people, including the musicians, and the maintenance of studios and offices. The company hopes, of course, that all its CDs will be hits, but the reality is that only some will be. At the least, the company wants to break even—that is, not lose any money—on each CD. Cost-volume-profit analysis is an important tool that enables the company's managers to understand how many CDs they must sell to avoid losing money and what their profit potential is if they have a hit. It is also an important tool in setting sales targets.

Cost-volume-profit (C-V-P) analysis is an examination of the cost behavior patterns that underlie the relationships among cost, volume of output, and profit. C-V-P analysis usually applies to a single product, product line, or division of a company. The word *profit* is used in the C-V-P equation because that figure is only a part of the entire company's operating income. In cases involving the income statement of an entire company, the term *operating income* is more appropriate than *profit*. In the context of C-V-P analysis, *profit* and *operating income* mean the same thing. C-V-P analysis is a tool for both planning and control. The process involves a number of techniques and problem-solving procedures based on the cost behavior patterns in an organization. The techniques express relationships among revenue, sales mix, cost, volume, and profit. Those relationships provide a general model of financial activity that managers can use for short-range planning, evaluating performance, and analyzing alternatives.

For planning, managers can use C-V-P analysis to calculate net income when sales volume is known. Or, through C-V-P analysis, managers can decide the level of sales needed to reach a target amount of net income. C-V-P analysis is also used extensively in budgeting.

The C-V-P relationship is expressed in a simple equation.

$$\text{Sales Revenue} = \text{Variable Costs} + \text{Fixed Costs} + \text{Profit}$$

Or

$$S = VC + FC + P$$

Cost-volume-profit analysis is a way of measuring how well the departments in an organization are performing. At the end of a period, sales volume and related actual costs are analyzed to find actual net income. A department's performance is measured by comparing actual costs with expected costs, costs that have been computed by applying C-V-P analysis to actual sales volume. The result is a performance report on which managers can base the control of operations.

Basic C-V-P analysis can also be applied to measure the effects of alternative choices: changes in variable and fixed costs, expansion or contraction of sales volume, increases or decreases in selling prices, or other changes in operating methods

FOCUS ON INTERNATIONAL BUSINESS

How does C-V-P analysis in Japan, Germany, Great Britain, or Canada differ from the same analysis in the United States? The only difference is in the measures used. The procedures and formulas remain the same.

Instead of expressing volume in pounds or gallons, those countries use metric measures, such as grams and liters. Whereas our cost and profit amounts are expressed in dollars, Japan's amounts would be in yen, Germany's in euros, Great Britain's in British pounds, and Canada's in Canadian dollars. Most management accounting procedures and analyses are appropriate for use by companies in any free economy. All that changes are the units of measurement.

or policies. Cost-volume-profit analysis is useful for making decisions about product pricing, product mix analysis (when an organization produces more than one product or offers more than one service), adding or dropping a product line, and accepting special orders. There are many applications of C-V-P analysis, and all are used by managers to plan and control operations effectively.

Breakeven Analysis

OBJECTIVE

5 Compute a breakeven point in units of output and in sales dollars, and prepare a breakeven graph

Breakeven analysis uses the basic elements of cost-volume-profit relationships. The **breakeven point** is the point at which total revenues equal total costs. Breakeven, then, is the point at which an organization begins to earn a profit. When a new venture or product line is being planned, the likelihood of the project's success can be quickly measured by finding its breakeven point. If, for instance, breakeven is 50,000 units and the total market is only 25,000 units, the idea should be abandoned promptly.

Sales (S), variable costs (VC), and fixed costs (FC) are used to compute the breakeven point, which can be stated in terms of sales units or sales dollars. The general equation for finding the breakeven point is:

$$S = VC + FC$$

For example, Dakota Products, Inc., makes special wooden stands for portable compact disk players that include a protective storage compartment for the disks. Variable costs are \$50 per unit, and fixed costs average \$20,000 per year. Each wooden stand sells for \$90. Given this information, we can compute the breakeven point for this product in sales units (x equals sales units):

$$S = VC + FC$$

$$\$90x = \$50x + \$20,000$$

$$\$40x = \$20,000$$

$$x = 500 \text{ Units}$$

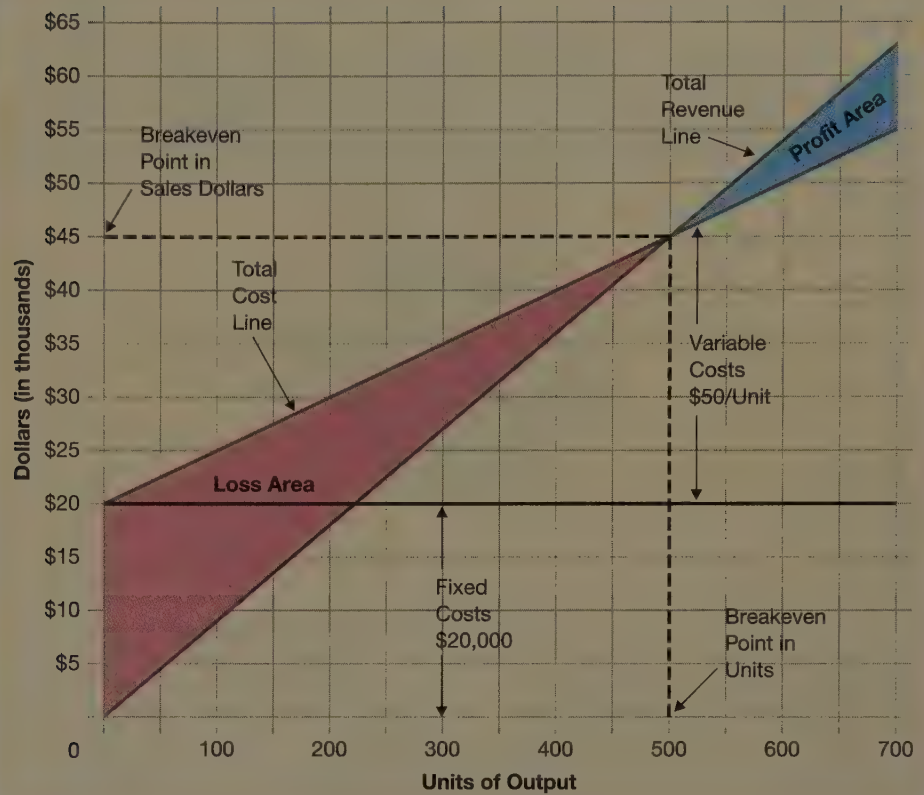
and in sales dollars:

$$\$90 \times 500 \text{ Units} = \$45,000$$

We can also make a rough estimate of the breakeven point using a graph. This method is less exact, but it does yield meaningful data. Figure 9 shows a breakeven graph for Dakota Products, Inc. The graph has five parts.

1. A horizontal axis in volume or units of output
2. A vertical axis in dollars of revenue
3. A line running horizontally from the vertical axis at the level of fixed costs

Figure 9
Graphic Breakeven Analysis:
Dakota Products, Inc.



4. A total cost line that begins at the point where the fixed cost line crosses the vertical axis and slopes upward to the right (The slope of the line depends on the variable cost per unit.)
5. A total revenue line that begins at the origin of the vertical and horizontal axes and slopes upward to the right (The slope depends on the selling price per unit.)

At the point where the total revenue line crosses the total cost line, revenues equal total costs. The breakeven point, stated in either units or dollars of sales, is found by extending broken lines from this point to the axes. As Figure 9 shows, Dakota Products, Inc., will break even when 500 wooden stands have been made and sold for \$45,000.

Contribution Margin

OBJECTIVE

6 Define *contribution margin* and use the concept to determine a company's breakeven point for a single product and for multiple products

A simpler method of determining the breakeven point uses contribution margin. **Contribution margin** is the amount that remains after total variable costs are subtracted from sales. A product line's contribution margin represents its net contribution to paying off fixed costs and earning a profit.

$$S - VC = CM$$

Profit is what remains after fixed costs are paid and subtracted from the contribution margin.

$$CM - FC = P$$

The example that follows uses contribution margin to determine the profitability of Dakota Products, Inc.

		Units Produced and Sold		
Symbols		250	500	750
S	Sales revenue (\$90 per unit)	\$22,500	\$45,000	\$67,500
VC	Less variable costs (\$50 per unit)	12,500	25,000	37,500
CM	Contribution margin (\$40 per unit)	\$10,000	\$20,000	\$30,000
FC	Less fixed costs	20,000	20,000	20,000
P	Profit (loss)	<u>(\$10,000)</u>	<u>—</u>	<u>\$10,000</u>

The breakeven point (BE) can be expressed as the point at which contribution margin minus total fixed costs equals zero (or the point at which contribution margin equals total fixed costs). In terms of units of product, the equation for the breakeven point looks like this:

$$(\text{CM per Unit} \times \text{BE Units}) - \text{FC} = 0$$

The formula that also generates the breakeven point in units is

$$\text{BE Units} = \frac{\text{FC}}{\text{CM per Unit}}$$

To show how the formula works, we use the data for Dakota Products, Inc.

$$\text{BE Units} = \frac{\text{FC}}{\text{CM per Unit}} = \frac{\$20,000}{\$90 - \$50} = \frac{\$20,000}{\$40} = 500 \text{ Units}$$

The breakeven point in total sales dollars may be determined by multiplying the breakeven point in units by the selling price (SP) per unit.

$$\text{BE Dollars} = \text{SP} \times \text{BE Units} = \$90 \times 500 \text{ Units} = \$45,000$$

An alternative way of determining the breakeven point in total sales dollars is to divide the fixed costs by the contribution margin ratio. The contribution margin ratio is the contribution margin divided by the selling price.

$$\text{CM Ratio} = \frac{\text{CM}}{\text{SP}} = \frac{\$40}{\$90} = .444, \text{ or } 4/9$$

$$\text{BE Dollars} = \frac{\text{FC}}{\text{CM Ratio}} = \frac{\$20,000}{4/9} = \$45,000$$

FOCUS ON BUSINESS PRACTICE



Understanding their costs helps fast-food restaurants, such as McDonald's, increase their profitability in at least two ways. First, such restaurants encourage customers to buy "value meals," combinations of three products (such as sandwich, drink, and fries) at a lower total price than the three items purchased separately. Although the contribution margin of a

value meal is lower than the combined contribution margins of the three products sold separately, McDonald's knows from experience that value meals lead to higher total sales. Second, McDonald's offers to "supersize" an order for the bargain price of only a few cents more. Supersizing increases the total contribution margin because the additional variable cost of the larger size is very small. Profitability is enhanced even though revenue is increased by only a small amount. Selling larger sizes is so important to a fast-food restaurant's profitability that a common performance measure is the percentage of value meals that are supersized.

Figure 10
Sales Mix for Dakota Products, Inc.



Multiple Products (Sales Mix)

Many manufacturing organizations sell a variety of products to satisfy different customer needs. These products frequently have different variable and fixed costs or different selling prices. To calculate the breakeven point for each product, the unit contribution margin for each product must be weighted by the sales mix. The **sales mix** is the proportion of each product's unit sales relative to the organization's total unit sales. Let's assume that Dakota Products, Inc., sells two types of wooden stands for portable compact disk players: the Floor Stand model, which is placed on the floor and has high storage capacity, and the Tabletop model, which is smaller and can be placed in entertainment units. If Dakota sells 500 units, of which 300 units are Floor Stands and 200 units are Tabletops, the sales mix would be 3:2. For every 3 Floor Stand models sold, 2 Tabletop models are sold. The sales mix can also be stated in percentages. Of the 500 units sold, 60 percent ($300 \div 500$) are Floor Stand sales and 40 percent ($200 \div 500$) are Tabletop sales (see Figure 10).

The breakeven point for multiple products can be computed in three steps. We will illustrate using Dakota Products, Inc.'s sales mix of 60 percent Floor Stands to 40 percent Tabletops; total fixed costs of \$32,000; and the selling price, variable cost per unit, and contribution margin per unit for each product line presented in Step 1 below.

Step 1: Compute the weighted-average contribution margin.

Calculate the weighted-average contribution margin by multiplying the contribution margin for each product by its percentage of the sales mix.

	Sales	Variable Costs	Contribution Margin (CM)	Percentage of Sales Mix	Weighted-Average CM
Floor Stand	\$90	– \$50	= \$40	× .60	= \$24
Tabletop	\$40	– \$20	= \$20	× .40	= \$ 8
Weighted-average contribution margin					<u>\$32</u>

Step 2: Calculate the weighted-average breakeven point.

Compute the weighted-average breakeven point by dividing total fixed costs by the weighted-average contribution margin.

$$\begin{aligned}
 \text{Weighted-Average Breakeven Point} &= \text{Total Fixed Costs} \div \text{Weighted-Average Contribution Margin} \\
 &= \$32,000 \div \$32 \\
 &= 1,000 \text{ Units}
 \end{aligned}$$

Step 3: Calculate the breakeven point for each product.

Multiply the weighted-average breakeven point by each product's percentage of the sales mix.

		Weighted-Average Breakeven Point		Sales Mix		Breakeven Point
Floor Stand	=	1,000 units	×	.60	=	600 Units
Tabletop	=	1,000 units	×	.40	=	400 Units

To verify, determine the contribution margin of each product and subtract the total fixed costs.

Contribution margin	
Floor Stand = 600 × \$40 =	\$24,000
Tabletop = 400 × \$20 =	8,000
Total contribution margin	\$32,000
Less fixed costs	32,000
Profit	—

Planning Future Sales

OBJECTIVE

7 Apply cost-volume-profit analysis to estimated levels of future sales and to changes in costs and selling prices

The primary goal of a business venture is not to break even; it is to generate profits. C-V-P analysis adjusted for targeted profit can be used to estimate the profitability of a venture. This approach is excellent for “what if” analysis, in which managers select several scenarios and compute the anticipated profit for each. For instance, what if sales increase by 17,000 units? What effect will the increase have on anticipated profit? What if sales increase by only 6,000 units? What if fixed costs are reduced by \$14,500? What if the variable unit cost increases by \$1.40? Each scenario generates a different amount of profit or loss.

To illustrate how C-V-P analysis can be applied, assume that the president of Dakota Products, Inc., Les Tibbs, has set \$4,000 in profit as this year's goal for the compact disk stands. If all the data in our earlier example stay as they were, how many compact disk stands must Dakota Products, Inc., make and sell to reach the target profit? Again, x equals the number of units.

$$\begin{aligned}
 S &= VC + FC + P \\
 \$90x &= \$50x + \$20,000 + \$4,000 \\
 \$40x &= \$24,000 \\
 x &= 600 \text{ Units}
 \end{aligned}$$

The answer is 600 units. To check the answer, insert all known data into the equation.

$$\begin{aligned}
 S - VC - FC &= P \\
 (600 \text{ Units} \times \$90) - (600 \times \$50) - \$20,000 &= \$4,000 \\
 \$54,000 - \$30,000 - \$20,000 &= \$4,000
 \end{aligned}$$

The contribution margin approach can also be used for profit planning. To do so, we simply add the target profit to the numerator of the contribution margin breakeven equation:

$$\text{Target Sales Units} = \frac{FC + P}{\text{CM per Unit}}$$

Using the data from the Dakota Products, Inc., example, the number of sales units needed to generate \$4,000 in profit is computed this way:

$$\text{Target Sales Units} = \frac{\text{FC} + \text{P}}{\text{CM per Unit}} = \frac{\$20,000 + \$4,000}{\$40} = \frac{\$24,000}{\$40} = 600 \text{ Units}$$

Let's continue to look at the planning activities of Dakota Products, Inc. The contribution income statement below focuses on cost behavior, not cost function. All variable costs related to production, selling, and administration are subtracted from sales to determine the total contribution margin. All fixed costs related to production, selling, and administration are subtracted from the total contribution margin to determine operating income. This format is used internally by managers to help make decisions about the company's operations.

Dakota Products, Inc. Contribution Income Statement For the Year Ended December 31, 20x4		
	Per Unit	Total for 600 Units
Sales revenue	\$90	\$54,000
Less variable costs	50	30,000
Contribution margin	<u>\$40</u>	<u>\$24,000</u>
Less fixed costs		20,000
Operating income*		<u>\$ 4,000</u>

*Note that in an income statement it is more appropriate to refer to profit as operating income.

Les Tibbs wants the members of the planning team to consider three alternatives to the original plan shown in the contribution income statement. In the following sections, we examine each alternative and its impact on operating income. In the summary, we will review our work and analyze the different breakeven points.

ALTERNATIVE 1: DECREASE VARIABLE COSTS, INCREASE SALES VOLUME The planning team worked with production, purchasing, and sales employees to determine the operating income if the company purchased and used pine rather than oak to make the wooden compact disk stands. If pine is used, the direct materials cost per unit will decrease by \$3. The company plans to stain the pine to meet the needs of a new customer group, which will increase the sales volume by 10 percent. What will be the estimated operating income for this alternative? How will this alternative affect operating income?

SOLUTION

	Per Unit	Total for 660 units
Sales revenue	\$90	\$59,400
Less variable costs	47	31,020
Contribution margin	<u>\$43</u>	<u>\$28,380</u>
Less fixed costs		20,000
Operating income		<u>\$ 8,380</u>
Increase in operating income (\$8,380 – \$4,000)		<u>\$ 4,380</u>

A different way to determine the impact of changes in selling price, cost, or sales volume on operating income is to analyze only the information that changes between the original plan and the proposed alternative. In Alternative 1, variable costs will decrease by \$3 (from \$50 to \$47), which will increase the contribution margin per unit by \$3 (from \$40 to \$43) for the 600 wooden stands planned to be sold. This will increase the total contribution margin and operating income by \$1,800 ($\3×600).

In addition, a sales increase of 60 units ($.10 \times 600$) will increase the total contribution margin and operating income by \$2,580 ($\43×60). The total increase in operating income due to the decrease in variable costs and the increase in sales volume will be \$4,380.

SOLUTION**Analysis of Changes Only**

Increase in contribution margin from	
Planned sales [$(\$43 - \$40) \times 600$ units]	\$1,800
Additional sales ($\$43 \times 60$ units)	<u>2,580</u>
Increase in operating income	<u>\$4,380</u>

ALTERNATIVE 2: INCREASE FIXED COSTS, INCREASE SALES VOLUME Instead of changing the direct materials, the Marketing Department suggested that a \$500 increase in advertising costs would increase sales volume by 5 percent. What will be the estimated operating income for this alternative? How will this alternative affect operating income?

SOLUTION

	Per Unit	Total for 630 units
Sales revenue	\$90	\$56,700
Less variable costs	<u>50</u>	<u>31,500</u>
Contribution margin	<u>\$40</u>	\$25,200
Less fixed costs		<u>20,500</u>
Operating income		<u>\$ 4,700</u>
Increase in operating income ($\$4,700 - \$4,000$)		<u>\$ 700</u>

Additional advertising costs will affect both sales volume and fixed costs. The sales volume will increase by 30 stands, from 600 units to 630 units (600×1.05), which increases the total contribution margin and operating income by \$1,200 (from \$24,000 to \$25,200). Fixed costs will increase from \$20,000 to \$20,500, which decreases operating income by \$500. The increase in operating income will be \$700 ($\$1,200 - \500).

SOLUTION**Analysis of Changes Only**

Increase in contribution margin from	
additional units sold [$\$40 \times (600 \times .05)$]	\$1,200
Less increase in fixed costs	<u>500</u>
Increase in operating income	<u>\$ 700</u>

ALTERNATIVE 3: INCREASE SELLING PRICE, DECREASE SALES VOLUME Les Tibbs asked the planning team to evaluate the impact of a \$10 increase in selling price on the company's operating income. The planning team believes that competitors are selling the same product at a lower price. If the selling price is increased, the team estimates that the sales volume will decrease by 15 percent. What will be the estimated operating income for this alternative? How will this alternative affect operating income?

SOLUTION

	Per Unit	Total for 510 Units
Sales revenue	\$100	\$51,000
Less variable costs	<u>50</u>	<u>25,500</u>
Contribution margin	<u>\$ 50</u>	<u>\$25,500</u>
Less fixed costs		<u>20,000</u>
Operating income		<u>\$ 5,500</u>
Increase in operating income (\$5,500 – \$4,000)		<u>\$ 1,500</u>

The \$3,000 decrease in sales revenue is more than offset by the \$4,500 decrease in variable costs, resulting in an increase in the contribution margin and operating income of \$1,500.

SOLUTION

Analysis of Changes Only

Increase in contribution margin from increase in selling price (\$10 increase in selling price × 510 units sold)	\$5,100
Decrease in contribution margin from decrease in sales volume (\$40 contribution margin per unit × 90 sales units lost)	(3,600)
Increase in operating income	<u>\$1,500</u>

COMPARATIVE SUMMARY In preparation for a meeting with Les Tibbs, the planning team at Dakota Products, Inc., compiled the summary presented in Exhibit 1. It compares the three alternatives to the original plan and shows how changes in variable and fixed costs, selling price, and sales volume will affect the breakeven point.

Note that the decrease in variable costs (direct materials) proposed in Alternative 1 increases the contribution margin per unit (from \$40 to \$43), which reduces the breakeven point. Since fewer sales dollars are required to cover variable

Exhibit 1

Comparative Summary of Alternatives at Dakota Products, Inc.

	Original Plan Totals for 600 Units	Alternative 1 Decrease Direct Materials Cost for 660 Units	Alternative 2 Increase Advertising for 630 Units	Alternative 3 Increase Selling Price for 510 Units
Sales revenue	\$54,000	\$59,400	\$56,700	\$51,000
Less variable costs	<u>30,000</u>	<u>31,020</u>	<u>31,500</u>	<u>25,500</u>
Contribution margin	\$24,000	\$28,380	\$25,200	\$25,500
Less fixed costs	<u>20,000</u>	<u>20,000</u>	<u>20,500</u>	<u>20,000</u>
Operating income	<u>\$ 4,000</u>	<u>\$ 8,380</u>	<u>\$ 4,700</u>	<u>\$ 5,500</u>
Breakeven point in whole units				
\$20,000 FC ÷ \$40 CM	500			
\$20,000 FC ÷ \$43 CM		465		
\$20,500 FC ÷ \$40 CM			513	
\$20,000 FC ÷ \$50 CM				400

costs, the breakeven point is reached sooner, at a sales volume of 465 units, which is lower than the breakeven point of 500 units in the original plan. In Alternative 2 the increase in fixed costs has no effect on the contribution margin per unit, but it does require the total contribution margin to cover more fixed costs before reaching the breakeven point. Thus, the breakeven point of 513 units is higher than the breakeven point of 500 units in the original plan. The increase in selling price in Alternative 3 increases the contribution margin per unit, which reduces the breakeven point. Because more sales dollars are available to cover fixed costs, the breakeven point of 400 units is lower than the breakeven point for the original plan.

Which plan should Tibbs choose? If he wants to select the alternative with the highest operating income shown in Exhibit 1, he will choose Alternative 1. However, if he focuses on the breakeven point, he may prefer to choose Alternative 3. Because the breakeven point for that alternative is 400 units, Dakota Products, Inc., can begin generating operating income more quickly.

Remember that the breakeven point provides a rough estimate of the number of units that must be sold to cover the total costs. Additional qualitative information may help Tibbs make a better decision. Will customers perceive that the quality of the compact disk stands is lower if the company uses pine rather than oak as proposed in Alternative 1? Has the company chosen the best form of advertising to yield a 5 percent increase in sales volume for Alternative 2? Will the increase in selling price suggested in Alternative 3 create more than a 15 percent decline in unit sales? Quantitative information is helpful for planning, but managers must also be sensitive to qualitative factors, such as product quality, reliability and quality of suppliers, and availability of human and technical resources.

Assumptions Underlying C-V-P Analysis

Cost-volume-profit analysis is useful only under certain conditions and only when certain assumptions hold true. Those assumptions and conditions are as follows:

1. The behavior of variable and fixed costs can be measured accurately.
2. Costs and revenues have a close linear approximation. For example, if costs rise, revenues rise proportionately.
3. Efficiency and productivity hold steady within the relevant range of activity.
4. Cost and price variables also hold steady during the period being planned.
5. The sales mix does not change during the period being planned.
6. Production and sales volume are roughly equal.

If one or more of these conditions and assumptions are absent, the C-V-P analysis may be misleading.

Applying C-V-P Analysis to a Service Business

OBJECTIVE

8 Apply cost-volume-profit analysis to a service business

Now, to see how C-V-P analysis can be applied to a service business, we will study four decisions that were made by a mortgage company. Assume that Lynn Chumbley, the manager of the Appraisal Department at Portland Mortgage Company, wants to plan the home appraisal activities that are required for each mortgage loan application. The following information has been estimated for the next year.

Service fee revenue:	\$400 per appraisal
Variable costs:	Direct professional labor, \$160 per appraisal
	County survey map fee, \$99 per appraisal

Mixed costs:	Monthly service overhead:		
Volume	Month	Activity Level	Cost
Highest	March	106 appraisals	\$20,346
Lowest	February	98 appraisals	20,018

Estimated average home appraisals per month next year: 100

DECISION 1: ESTIMATING SERVICE OVERHEAD COSTS Chumbley would like to estimate the total service overhead cost of appraisals for next year. Use the high-low method to calculate the cost formulas that will estimate service overhead costs for next year.

Step 1: Calculate the variable service overhead cost per appraisal.

$$\begin{aligned}
 \text{Variable Service Overhead Cost per Appraisal} &= (\text{Highest Cost} - \text{Lowest Cost}) \div \\
 &\quad (\text{Highest Volume} - \text{Lowest Volume}) \\
 &= (\$20,346 - \$20,018) \div \\
 &\quad (106 - 98) \\
 &= \$328 \div 8 \text{ Appraisals} = \$41
 \end{aligned}$$

Step 2: Calculate the total fixed service overhead costs.

$$\begin{aligned}
 \text{Total Fixed Service Overhead Costs} &= \text{Total Service Overhead Costs} - \\
 &\quad \text{Total Variable Service Overhead Costs} \\
 \text{Total Fixed Service Overhead Costs for March} &= \$20,346 - (\$41 \times 106) \\
 &= \$16,000
 \end{aligned}$$

Step 3: State the formula for total service overhead costs for one month.

$$\begin{aligned}
 \text{Total Service Overhead Costs} &= \text{Total Fixed Service Overhead Costs} + (\text{Variable} \\
 &\quad \text{Rate} \times \text{Estimated Number of Appraisals}) \\
 &= \$16,000 + (\$41 \text{ per Appraisal} \times \text{Number of} \\
 &\quad \text{Appraisals})
 \end{aligned}$$

Step 4: Calculate the total service overhead costs for one month, assuming that 100 appraisals will be made.

$$\text{Total Overhead Service Costs} = \$16,000 + (\$41 \times 100) = \$20,100$$

DECISION 2: DETERMINING THE BREAKEVEN POINT Chumbley would also like to know how many appraisals must be performed each month to cover the fixed and variable appraisal costs. Calculate the breakeven point.

Let x = Number of Appraisals per Month at Breakeven Point

$$S = VC + FC$$

$$\$400x = \$300x + \$16,000$$

$$\$100x = \$16,000$$

$$x = 160 \text{ Appraisals per Month}$$

The variable rate of \$300 per appraisal includes the variable service overhead rate, the direct professional labor, and the county survey map fee (\$41 + \$160 + \$99).

DECISION 3: DETERMINING THE EFFECT OF A CHANGE IN OPERATING COSTS

Lynn Chumbley is worried because an average of only 100 appraisals can be processed each month, but the estimated breakeven point is 160 appraisals per

month. Because of strong competition in the community, the mortgage company cannot increase its fee. Chumbley has been asked to reduce costs so that the mortgage company can profit from home appraisals. She reviewed the situation and determined that improved scheduling of appraisals would reduce travel time. The current professional labor cost of \$160 per appraisal covers the fee of one appraiser working four hours at \$40 per hour. By scheduling the jobs based on location, Chumbley can reduce the appraisers' travel time enough to reduce the total time required by 50 percent. As a result, the professional labor cost will decrease to \$80 $[(.50 \times 4 \text{ hours}) \times \$40 \text{ per hour}]$ for one appraiser working two hours at \$40 per hour. The new scheduling process will increase fixed costs by \$200 per month. What would be the new breakeven point?

Let x = Number of Appraisals per Month at Breakeven Point

$$S = VC + FC$$

$$\$400x = \$220x + \$16,200$$

$$\$180x = \$16,200$$

$$x = 90 \text{ Appraisals per Month}$$

Variable costs become \$220 $(\$300 - \$80)$ per appraisal due to the reduced labor costs. This change increases the contribution margin by \$80 per appraisal. Fixed costs increase from \$16,000 to \$16,200. The increase in the contribution margin is greater than the increase in the fixed costs, so the breakeven point decreases from 160 appraisals per month to 90 appraisals per month.

DECISION 4: ACHIEVING A TARGET PROFIT How many appraisals would have to be performed each month to achieve a target profit of \$18,000 per month?

Let x = Target Sales in Units

$$S = VC + FC + P$$

$$\$400x = \$220x + \$16,200 + \$18,000$$

$$\$180x = \$34,200$$

$$x = 190 \text{ units}$$

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

- 1. Define cost behavior and explain how managers use this concept in the management cycle.** Cost behavior is the way costs respond to changes in volume or activity. Some costs vary in relation to volume or operating activity; other costs remain fixed as volume changes. Cost behavior depends on whether the focus is total costs or cost per unit. Variable costs vary in total as volume changes but are fixed per unit; fixed costs are fixed in total as volume changes but vary per unit. Managers use information about cost behavior in almost every decision they make. Whenever managers are asked to make a decision, they must always deal with cost ramifications, and they must understand and anticipate cost behavior patterns if they are to decide correctly.
- 2. Identify specific types of variable and fixed cost behavior, and discuss how operating capacity and relevant range relate to cost behavior.** Total costs that change in direct proportion to changes in productive output (or any other volume measure) are called variable costs. Hourly wages, the cost of operating supplies, direct materials costs, and the cost of merchandise are all variable costs. Total fixed costs remain constant within a relevant range

of volume or activity. They change only when activity exceeds the anticipated relevant range because, for example, new equipment or new buildings must be purchased, higher insurance premiums and property taxes must be paid, or additional supervisory personnel must be hired to accommodate the increased activity. Operating capacity is the upper limit of productive output and is a basis for determining cost behavior patterns. Those patterns change if capacity changes.

3. Define *mixed cost*, and use the high-low method to separate the variable and fixed components of a mixed cost. A mixed cost, such as the cost of electricity, has both variable and fixed cost components. The high-low method, which identifies a linear relationship between activity level and cost, is the easiest way to separate variable costs from fixed costs in a mixed cost.

4. Define *cost-volume-profit analysis* and discuss how managers use this analysis. Cost-volume-profit analysis is an examination of the cost behavior patterns that underlie the relationships among cost, volume of output, and profit. C-V-P analysis is a tool for both planning and control. The process involves a number of techniques and problem-solving procedures based on the cost behavior patterns in an organization. This form of analysis provides a general model of financial activity that management can use for short-range planning, evaluating performance, and analyzing alternatives.

5. Compute a breakeven point in units of output and in sales dollars, and prepare a breakeven graph. The breakeven point is the point at which total revenues equal total costs, the point at which net sales equal variable costs plus fixed costs. Once the number of units needed to break even is known, the number can be multiplied by the product's selling price to determine the breakeven point in sales dollars.

A breakeven graph is made up of a horizontal axis (units) and a vertical axis (dollars). Three lines are plotted: The fixed cost line runs horizontally from the point on the vertical axis representing total fixed cost. The total cost line begins at the intersection of the fixed cost line and the vertical axis and runs upward to the right. The total revenue line runs from the intersection of the two axes upward to the right. The slope of the total cost line is determined by the variable cost per unit; the slope of the total revenue line is determined by the selling price per unit. The point at which the total cost and the total revenue lines cross determines the breakeven point in units or in dollars.

6. Define *contribution margin* and use the concept to determine a company's breakeven point for a single product and for multiple products. Contribution margin is the excess of revenues over all variable costs related to a particular sales volume. A product's contribution margin represents its net contribution to paying off fixed costs and earning a profit. The breakeven point in units can be computed by using the following formula:

$$\text{BE Units} = \frac{\text{FC}}{\text{CM per Unit}}$$

A sales mix is used to calculate the breakeven point for each product when a company sells more than one product.

7. Apply cost-volume-profit analysis to estimated levels of future sales and to changes in costs and selling prices. The addition of target profit to the breakeven equation makes it possible to plan levels of operation that yield a target profit. The formula in terms of contribution margin is

$$\text{Target Sales Units} = \frac{\text{FC} + \text{P}}{\text{CM per Unit}}$$

8. Apply cost-volume-profit analysis to a service business. A service business can use cost-volume-profit analysis to separate mixed costs into their variable and fixed portions, calculate a breakeven point, and plan operating income when changes in cost, volume, or price occur.

REVIEW OF
CONCEPTS AND
TERMINOLOGY

LO 5
LO 6

The following concepts and terms were introduced in this chapter:

LO 1

Breakeven point: The point at which total revenues equal total costs.

LO 4

Contribution margin: The amount that remains after total variable costs are subtracted from sales.

LO 2

Cost behavior: The way costs respond to changes in volume or activity.

LO 2

Cost-volume-profit (C-V-P) analysis: An examination of the cost behavior patterns that underlie the relationships among cost, volume of output, and profit.

LO 3

Excess capacity: Machinery and equipment kept on standby.

LO 3

Fixed costs: Total costs that remain constant within a relevant range of volume or activity.

LO 2

High-low method: A three-step approach to separating a mixed cost into its variable and fixed components.

LO 2

Mixed costs: Costs that have both variable and fixed components; part of the cost changes with volume or usage, and part of the cost is fixed over the period.

LO 2

Normal capacity: The average annual level of operating capacity needed to meet expected sales demand.

LO 6

Operating capacity: The upper limit of an organization's productive output capability, given its existing resources.

LO 2

Practical capacity: Theoretical capacity reduced by normal and expected work stoppages.

LO 2

Relevant range: The span of activity in which a company expects to operate.

LO 7

Sales mix: The proportion of each product's unit sales relative to the organization's total unit sales.

Scatter diagram: A chart of plotted points that helps determine if there is a linear relationship between a cost item and its related activity measure.

Theoretical capacity: The maximum productive output for a given period, assuming that all machinery and equipment is operating at optimum speed, without interruption. Also called *ideal capacity*.

Variable costs: Total costs that change in direct proportion to changes in productive output or any other measure of volume.

REVIEW
PROBLEM

LO 5
LO 6
LO 7

Breakeven and Profit Planning Analysis

Instrument City, Inc., is a major producer of pipe organs. Its Model D14 is a double-manual organ with a large potential market. Below is a summary of data from 20x1 operations for Model D14.

Variable costs per unit	
Direct materials	\$ 2,300
Direct labor	800
Manufacturing overhead	600
Selling expense	500
Total fixed costs	
Manufacturing overhead	195,000
Advertising	55,000
Administrative expense	68,000
Selling price per unit	9,500

REQUIRED

1. Compute the breakeven point in units for 20x1.
2. Instrument City sold 65 D14 models in 20x1. How much profit did the company realize?
3. Management is considering alternative courses of action for 20x2. (Use the figures from 2 and treat each alternative independently.)
 - a. Calculate the number of units that must be sold to generate a target profit of \$95,400. Assume that costs and selling price remain constant.
 - b. Calculate the operating income if the company increases the number of units sold by 20 percent and cuts the selling price by \$500 per unit.
 - c. Determine the number of units that must be sold to break even if advertising is increased by \$47,700.
 - d. If variable costs are cut by 10 percent, find the number of units that must be sold to generate a target profit of \$120,000.

ANSWER TO REVIEW PROBLEM

1. Compute the breakeven point in units for 20x1.

$$\text{Breakeven Units} = \frac{\text{FC}}{\text{CM per Unit}} = \frac{\$318,000}{\$9,500 - \$4,200} = \frac{\$318,000}{\$5,300} = 60 \text{ Units}$$

2. Calculate the profit from sales of 65 units.

Units sold	65
Units required to break even	<u>60</u>
Units over breakeven	<u>5</u>

$$20x1 \text{ profit} = \$5,300 \text{ per unit} \times 5 = \$26,500$$

Contribution margin equals sales minus all variable costs. Contribution margin per unit equals the amount of sales dollars remaining, after variable costs have been subtracted, to cover fixed costs and earn a profit. If all fixed costs have been absorbed by the time breakeven is reached, the entire contribution margin of each unit sold in excess of breakeven represents profit.

3. a. Calculate the number of units that must be sold to generate a target profit of \$95,400.

$$\begin{aligned} \text{Target Sales Units} &= \frac{\text{FC} + \text{P}}{\text{CM per Unit}} \\ &= \frac{\$318,000 + \$95,400}{\$5,300} = \frac{\$413,400}{\$5,300} = 78 \text{ Units} \end{aligned}$$

- b. Calculate the operating income if unit sales increase 20 percent and unit selling price decreases by \$500.

Sales revenue [78 (65 × 1.20) units at \$9,000 per unit]	\$702,000
Less variable costs (78 units × \$4,200)	<u>327,600</u>
Contribution margin	\$374,400
Less fixed costs	<u>318,000</u>
Operating income	<u>\$ 56,400</u>

- c. Determine the number of units needed to break even if advertising costs (fixed costs) increase by \$47,700.

$$\begin{aligned} \text{BE Units} &= \frac{\text{FC}}{\text{CM per Unit}} \\ &= \frac{\$318,000 + \$47,700}{\$5,300} = \frac{\$365,700}{\$5,300} = 69 \text{ Units} \end{aligned}$$

- d. Calculate the number of units that must be sold to generate a target profit of \$120,000 if variable costs decrease by 10 percent.

$$\text{CM per Unit} = \$9,500 - (\$4,200 \times .9) = \$9,500 - \$3,780 = \$5,720$$

$$\begin{aligned}\text{Target Sales Units} &= \frac{\text{FC} + \text{P}}{\text{CM per Unit}} \\ &= \frac{\$318,000 + \$120,000}{\$5,720} = \frac{\$338,000}{\$5,720} = 76.57 \text{ or } 77 \text{ Units}\end{aligned}$$

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. Define *cost behavior*.
2. Why is an understanding of cost behavior useful to managers?
3. What is the difference between theoretical capacity and practical capacity?
4. Why does a company never operate at theoretical capacity?
5. Define *excess capacity*.
6. What is normal capacity? Why is normal capacity considered more relevant and useful than either theoretical or practical capacity?
7. What does *relevant range of activity* mean?
8. What makes variable costs different from fixed costs?
9. "Fixed costs remain constant in total but decrease per unit as productive output increases." Explain this statement.
10. What is a mixed cost? Give an example.
11. What is a scatter diagram?
12. Describe the high-low method of separating mixed costs.
13. Define *cost-volume-profit analysis*.
14. Identify two uses of C-V-P analysis and explain their significance to management.
15. Define *breakeven point*. Why is information about the breakeven point important to managers?
16. Define *contribution margin* and describe its use in breakeven analysis.
17. State the equation that determines target sales units using the elements of fixed costs, target profit, and contribution margin per unit.
18. What conditions must be met for C-V-P computations to be accurate?
19. Give examples of the ways in which C-V-P analysis can be used in a service organization.
20. Compare and contrast breakeven analysis for manufacturing organizations with breakeven analysis for service organizations.

SHORT EXERCISES

- SE 1.** Patrick's Hat Makers is in the business of designing specialty hats. The material that goes into producing a derby costs \$4.50 per unit, and Patrick's pays each of its two full-time hat makers \$250 per week. If hat maker A makes 15 derbies in one week, what is the variable cost per derby, and what is this worker's fixed cost per derby? If hat maker B makes only 12 derbies in one week, what are this worker's variable and fixed costs per derby? (Round to two decimal places where necessary.)
- SE 2.** Identify the following as either fixed costs, variable costs, or mixed costs.
- | | | |
|---|-----------------------|----------------------------------|
| LO 1 Concept of Cost Behavior | 1. Direct materials | 4. Personnel manager's salary |
| LO 2 Identification of Variable, | 2. Telephone expense | 5. Factory building rent payment |
| LO 3 Fixed, and Mixed Costs | 3. Operating supplies | |

- LO 3 Mixed Costs: High-Low Method** **SE 3.** Using the high-low method and the following information, compute the monthly variable costs per telephone hour and fixed costs for Sadiko Corporation.
- | Month | Business Telephone Hours | Telephone Expenses |
|-------|--------------------------|--------------------|
| April | 96 | \$4,350 |
| May | 93 | 4,230 |
| June | 105 | 4,710 |
- LO 4 Cost-Volume-Profit Analysis** **SE 4.** Delacruz, Inc., wishes to make a profit of \$20,000. The company has variable costs of \$80 per unit and fixed costs of \$12,000. How much must Delacruz charge per unit if 4,000 units are sold?
- LO 5 Computing the Breakeven Point** **SE 5.** How many units must Marsik Company sell to break even if the selling price per unit is \$8.50, variable costs are \$4.30 per unit, and fixed costs are \$3,780? What is the breakeven point in total dollars of sales?
- LO 6 Contribution Margin** **SE 6.** Using the contribution margin approach, find the breakeven point in units for Dubois Consumer Products if the selling price per unit is \$11, the variable cost per unit is \$6, and the fixed costs are \$5,500.
- LO 6 Contribution Margin Ratio Approach** **SE 7.** Using the information in SE 6, compute the breakeven in total sales dollars using the contribution margin ratio.
- LO 6 Cost-Volume-Profit Analysis for Multiple Products** **SE 8.** Using the contribution margin approach, find the breakeven point in units for Lacy Products' two products. Product A's selling price per unit is \$10 and its variable cost per unit is \$4. Product B's selling price per unit is \$8 and its variable cost per unit is \$5. Fixed costs are \$15,000, and the sales mix of Product A to Product B is 2:1.
- LO 7 Contribution Margin and Projected Profit** **SE 9.** If Sandoval Watches sells 300 watches at \$48 per watch and has variable costs of \$18 per watch and fixed costs of \$4,000, what is the projected profit?
- LO 8 Cost Behavior in a Service Business** **SE 10.** Eye Spy, a private investigation firm, has the following costs for December.
- | | |
|---------------------------------------|-----------------|
| Direct labor: | \$190 per case |
| Service overhead, December | |
| Salary for director of investigations | \$ 4,800 |
| Telephone | 930 |
| Depreciation | 8,300 |
| Legal advice | 2,300 |
| Supplies | 590 |
| Advertising | 360 |
| Utilities | 1,560 |
| Wages for clerical personnel | 2,000 |
| Total service overhead | <u>\$20,840</u> |
- Service overhead for October: \$21,150
 Service overhead for November: \$21,350
- The number of cases investigated during October, November, and December was 93, 97, and 91, respectively. Compute the variable and fixed cost components of service overhead. Then determine the variable and fixed costs per case for December. (Round to nearest dollar where necessary.)

EXERCISES

- LO 2 Identification of Variable and Fixed Costs** **E 1.** Tell whether each of the following costs of productive output is usually considered variable or fixed: (1) packing materials for stereo components, (2) real estate taxes, (3) gasoline for a delivery truck, (4) property insurance, (5) depreciation expense of buildings (straight-line method), (6) supplies, (7) indirect materials, (8) bottles used to package liquids, (9) license fees for company cars, (10) wiring used in radios, (11) machine helper's wages, (12) wood used in bookcases, (13) city operating license, (14) machine depreciation based on machine hours of usage, (15) machine operator's hourly wages, and (16) cost of required outside inspection of each unit produced.

LO 2 Variable Cost Analysis

- E 2.** Quick Time Oil Change has been in business for six months. Each oil change requires an average of four quarts of oil. The cost of oil to Quick Time Oil Change is \$.50 per quart. The estimated number of cars that will be serviced in the next three months is, respectively, 240, 288, and 360.

1. Compute the cost of oil for each of the three months and the total cost for all three months. Fill in the blanks in the following table.

Month	Cars to Be Serviced	Required Quarts/Car	Cost/Quart	Total Cost/Month
1	240	4	\$.50	_____
2	288	4	.50	_____
3	360	4	.50	_____
Three-month total	<u>888</u>			<u>_____</u>

2. Complete the following sentences by choosing the words that best describe the cost behavior at Quick Time Oil Change.

Cost per unit (increased, decreased, remained constant).

Total variable cost per month (increased, decreased) as the quantity of oil used (increased, decreased).

LO 3 Mixed Costs: High-Low Method

- E 3.** Kalibob Electronics Company manufactures major appliances. It just had its most successful year because of increased interest in its refrigerators. While preparing the budget for next year, Arnelle Autrey, the company's controller, compiled these data:

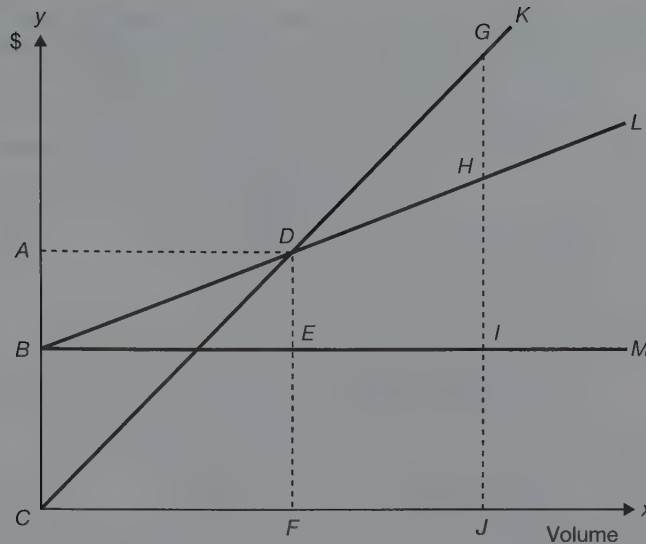
Month	Volume in Machine Hours	Electricity Costs
July	6,000	\$60,000
August	5,000	53,000
September	4,500	49,500
October	4,000	46,000
November	3,500	42,500
December	3,000	39,000

Using the high-low method, determine (1) the variable electricity cost per machine hour, (2) the monthly fixed electricity cost, and (3) the total variable electricity costs and fixed electricity costs for the six-month period.

LO 5 Graphical Analysis

- E 4.** Identify the letter of the point, line segment, or area of the breakeven graph on the next page that correctly completes each of the following statements.

- The maximum possible operating loss is
 - A.
 - B.
 - D.
 - F.
- The breakeven point in sales dollars is
 - C.
 - A.
 - D.
 - G.
- At volume *F*, total contribution margin is
 - C.
 - E.
 - D.
 - G.
- Net income is represented by area
 - KDL.
 - BDC.
 - KCJ.
 - GCJ.
- At volume *J*, total fixed costs are represented by
 - H.
 - I.
 - G.
 - J.
- If volume increases from *F* to *J*, the change in total costs is
 - HI minus DE.
 - BC minus DF.
 - DF minus HJ.
 - AB minus DE.



LO 5 Breakeven Analysis
LO 6

- E 5.** Tonia Manufacturing Company produces head covers for golf clubs. The company expects to generate a profit next year. It anticipates fixed manufacturing costs of \$126,500 and fixed general and administrative expenses of \$82,030 for the year. Variable manufacturing and selling costs per set of head covers will be \$4.65 and \$2.75, respectively. Each set will sell for \$13.40.

1. Compute the breakeven point in sales units.
2. Compute the breakeven point in sales dollars.
3. If the selling price is increased to \$14 per unit and fixed general and administrative expenses are cut by \$33,465, what would the new breakeven point be in units?
4. Prepare a graph to illustrate the breakeven point found in 2.

LO 5 Breakeven Analysis
LO 6 and Pricing
LO 7

- E 6.** Harrison Company has a plant capacity of 100,000 units per year, but the 20x2 budget indicates that only 60,000 units will be produced and sold. The entire 20x2 budget is as follows:

Sales (60,000 units at \$4)		\$240,000
Less cost of goods produced (based on production of 60,000 units)		
Direct materials (variable)	\$60,000	
Direct labor (variable)	30,000	
Variable manufacturing costs	45,000	
Fixed manufacturing costs	75,000	
Total cost of goods produced		<u>210,000</u>
Gross margin		\$ 30,000
Less selling and administrative expenses		
Selling (fixed)	\$24,000	
Administrative (fixed)	36,000	
Total selling and administrative expenses		<u>60,000</u>
Operating income		<u><u>(\$ 30,000)</u></u>

1. Given the budgeted selling price and cost data, how many units would Harrison have to produce and sell to break even? (**Hint:** Be sure to take selling and administrative expenses into consideration.)
2. Market research indicates that if Harrison were to drop its selling price to \$3.80 per unit, it could sell 100,000 units in 20x2. Would you recommend the drop in price? Indicate the new operating income or loss figure.

LO 6 Calculate Breakeven Point for Multiple Products

- E 7.** Aquatic Aquarium, Inc., manufactures and sells aquariums, water pumps, and air filters using a sales mix of 1:2:2. Using the contribution margin approach, find the breakeven point in units for each product. The company's fixed costs are \$26,000. Other information is as follows:

	Selling Price per Unit	Variable Cost per Unit
Aquariums	\$60	\$25
Water pumps	20	12
Air filters	10	3

LO 6 Sales Mix Analysis

- E 8.** Jo Lynn Mays is the owner of a hair design shop in Palm Springs, California. She provides three basic services: shampoo and set, permanents, and cut and blow dry. The following are operating results from the past quarter.

Type of Service	Number of Customers	Total Sales	Contribution Margin Dollars
Shampoo and set	1,200	\$24,000	\$14,700
Permanents	420	21,000	15,120
Cut and blow dry	1,000	15,000	10,000
	<u>2,620</u>	<u>\$60,000</u>	<u>\$39,820</u>
Total fixed costs			30,000
Profit			<u>\$ 9,820</u>

Compute the breakeven point in units based on the weighted average contribution margin for the given sales mix.

LO 6 Contribution
LO 7 Margin/Profit Planning

- E 9.** MSM Systems, Ltd., makes undersea missiles for nuclear submarines. Management has just been offered a government contract that may generate a profit for the company. The contract purchase price is \$130,000 per unit, but the number of units to be purchased has not yet been decided.

The company's fixed costs are budgeted at \$3,973,500, and the variable costs are \$68,500 per unit.

1. Compute the number of units the company should agree to make at the stated contract price to earn a target profit of \$1,500,000.
2. Using a lighter material, the variable unit cost can be reduced by \$1,730, but total fixed overhead will increase by \$27,500. How many units must be produced to make \$1,500,000 in profit?
3. Using the figures in 2, how many additional units must be produced to increase profit by \$1,264,600?

LO 7 Planning Future Sales
LO 8

- E 10.** Short-term automobile rentals are the specialty of Wexler Auto Rentals, Inc. Average variable operating costs have been \$12.50 per day per automobile. The company owns 60 cars. Fixed operating costs for the next year are expected to be \$145,500. Average daily rental revenue per automobile is expected to be \$34.50. Management would like to earn a target profit of \$47,000 during the year.

1. Calculate the total number of daily rentals the company must have during the year to earn the target profit.
2. On the basis of your answer to 1, determine the number of days on the average that each automobile must be rented.
3. Find the total revenue for the year needed to achieve a target profit of \$47,000.
4. What would the total rental revenue be if fixed operating costs could be lowered by \$5,180 and the target profit increased to \$70,000?

LO 8 Cost Behavior in a Service Business

- E 11.** Edgar Hun, CPA, provides tax services in Oconomo. To prepare standard short-form tax returns, he incurred the following costs for the previous three months.

Direct professional labor: \$50 per tax return

Service overhead (included telephone, depreciation on equipment and building, tax forms, office supplies, wages of clerical personnel, and utilities): January, \$18,500; February, \$20,000; March, \$17,000.

Number of tax returns prepared: January, 850; February, 1,000; March, 700.

1. Determine the variable and fixed cost components of the Service Overhead account.
2. What would be the estimated total cost per tax return if Hun's CPA firm prepares 825 standard short-form tax returns in April?

LO 8 C-V-P Analysis in a Service Business

- E 12.** Turner Inspection Service inspects cars at the end of their leases for automobile leasing companies. Jason Turner, the owner, receives \$50 for each inspection. He wants to expand his business by adding another employee and automobile. He computes an average cost of \$15 for each inspection. The fixed costs of the new employee and automobile are \$3,000 per month. How many inspections per month will the new employee have to perform to earn Turner a target profit of \$1,200?

PROBLEMS**LO 2 Cost Behavior and
LO 3 Projection
LO 8**

- P 1.** Lucent Auto, Inc., which opened for business on March 1, 20x1, specializes in revitalizing automobile exteriors. *Detailing* is the term used to describe the process. The objective is to make an automobile look as if it had just rolled off the showroom floor. Area market research indicates that a full exterior detail should cost about \$100. The company has just completed its first year of business and has asked its accountants to analyze the operating results. Management wants costs divided into variable, fixed, and mixed components and would like them projected for the coming year. Anticipated volume for next year is 1,100 jobs.

The process used to detail a car's exterior is as follows:

1. One \$20-per-hour employee spends 20 minutes cleaning the car's exterior.
2. One can per car of Tars-Off, a cleaning compound, is used on the trouble spots.
3. A chemical compound called Buff Glow 7 is used to remove oxidants from the paint surface and restore the natural oils to the paint.
4. Poly Wax is applied by hand, allowed to sit for 10 minutes, and then buffed off.
5. The final step is an inspection to see that all wax and debris have been removed.

On average, two hours are spent on each car, including the cleaning time and the drying time for the wax. The first-year operating information for Lucent Auto is as follows.

Number of automobiles detailed	840
Labor per auto	2 hours at \$20.00 per hour
Containers of Tars-Off consumed	840 at \$3.50 per can
Pounds of Buff Glow 7 consumed	105 pounds at \$32.00 per pound
Pounds of Poly Wax consumed	210 pounds at \$8.00 per pound
Rent	\$1,400.00 per month

During the year, utilities costs ranged from \$800 for 40 jobs in March to \$1,801 for 110 jobs in August.

1. Classify the costs as variable, fixed, or mixed.
2. Using the high-low method, separate the mixed costs into their variable and fixed components. Use number of jobs as the basis.
3. Project the same costs for next year, assuming that the anticipated increase in activity will occur and that fixed costs will remain constant.
4. Compute the unit cost per job for next year.
5. Based on your answer to 4, should the price remain at \$100 per job?

REQUIRED

LO 5 Breakeven Analysis**LO 6****REQUIRED**

- P 2.** At the beginning of each year, the Accounting Department at Zia Lighting, Ltd., must find the point at which projected sales revenue will equal total budgeted variable and fixed costs. The company makes custom-made, low-voltage outdoor lighting systems. Each system sells for an average of \$435. Variable costs per unit are \$210. Total fixed costs for the year are estimated to be \$166,500.

1. Compute the breakeven point in sales units.
2. Compute the breakeven point in sales dollars.
3. Find the new breakeven point in sales units if the fixed costs should go up by \$10,125.
4. Using the original figures, compute the breakeven point in sales units if the selling price decreases to \$425 per unit, fixed costs go up by \$15,200, and variable costs decrease by \$15 per unit.

LO 6 Planning Future Sales**LO 7****REQUIRED**

- P 3.** Garden Industries manufactures birdbaths, statues, and other decorative items for sale to retail home and garden centers and to florists. The company's Design Department has proposed a new product: a humorous-looking statue of a frog. Management believes that the frogs will be popular with home gardeners. Expected variable unit costs are as follows: direct materials, \$9.25; direct labor, \$4.00; production supplies, \$.55; selling costs, \$2.40; and other, \$3.05. The following are fixed costs: depreciation, building and equipment, \$33,000; advertising, \$40,000; and other, \$6,000. Management plans to sell the product for \$29.25.

1. Using the contribution margin approach, compute the number of statues the company must sell to (a) break even and (b) earn a profit of \$50,000.
2. Using the same data, compute the number of products that must be sold to earn a target profit of \$70,000 if advertising costs rise by \$20,000.
3. Using the original information and sales of 15,000 units, compute the new selling price the company must charge to make a target profit of \$100,000.
4. According to the vice president of marketing, Sameetha Rice, the most optimistic annual sales estimate for the frog statues would be 25,000 units if the price is reduced and advertising is increased. How much more can be spent on fixed advertising costs if the selling price is reduced to \$28.00 per statue, if the variable costs cannot be reduced, and if the target profit for sales of 25,000 statues is \$120,000?

LO 6 Planning Future Sales**LO 7****REQUIRED**

- P 4.** O'Byrne Company has a maximum capacity of 200,000 units per year. Variable manufacturing costs are \$12 per unit. Fixed manufacturing overhead is \$600,000 per year. Variable selling and administrative costs are \$5 per unit, and fixed selling and administrative costs are \$300,000 per year. The current sales price is \$23 per unit.

1. What is the breakeven point in (a) sales units and (b) sales dollars?
2. How many units must be sold to earn a target profit of \$240,000 per year?
3. A strike at a major supplier has caused a shortage of materials, so the current year's production and sales are limited to 160,000 units. Top management is planning to reduce fixed costs to \$841,000 to partially offset the effect of the reduced sales on profit. Variable cost per unit is the same as last year. The company already has sold 30,000 units at the regular selling price of \$23 per unit.
 - a. How much of the fixed costs was covered by the total contribution margin of the first 30,000 units sold?
 - b. What contribution margin per unit will be needed on the remaining 130,000 units to cover the remaining fixed costs and to earn a target profit of \$210,000 this year?

LO 7 Planning Future Sales**LO 8 for a Service Business**

- P 5.** Lesko Financial Corporation is a subsidiary of Polansky Enterprises. Processing loan applications is the main task of the corporation. Last year, Polly Bar, the manager of the Loan Department, established a policy of charging a \$250 fee for every loan application processed. Next year's variable costs have been projected as follows: loan consultant's wages, \$15.50 per hour (a loan application takes five hours to process); supplies, \$2.40 per application; and other variable costs, \$5.60 per application. Annual fixed

costs include depreciation of equipment, \$8,500; building rental, \$14,000; promotional costs, \$12,500; and other fixed costs, \$8,099.

REQUIRED

1. Using the contribution margin approach, compute the number of loan applications the company must process to (a) break even and (b) earn a target profit of \$14,476.
2. Continuing the same approach, compute the number of applications the company must process to earn a target profit of \$20,000 if promotional costs increase by \$5,662.
3. Assuming the original information and the processing of 500 applications, compute the loan application fee the company must charge if the target profit is \$41,651.
4. Polly Bar believes that 750 loan applications is the maximum number her staff can handle. How much more can be spent on promotional costs if the highest fee tolerable to the customer is \$280, if variable costs cannot be reduced, and if the target profit for such loan applications is \$50,000?

ALTERNATE PROBLEMS**LO 5 Breakeven Analysis****REQUIRED**

- P 6.** Locke & Lobel, a law firm in downtown St. Paul, is considering the development of a legal clinic for middle- and low-income clients. Paraprofessional help would be employed, and a billing rate of \$18 per hour would be used. The paraprofessionals would be law students who would work for only \$9 per hour. Other variable costs are anticipated to be \$5.40 per hour, and annual fixed costs are expected to total \$27,000.

1. Compute the breakeven point in billable hours.
2. Compute the breakeven point in total billings.
3. Find the new breakeven point in total billings if fixed costs should go up by \$2,340.
4. Using the original figures, compute the breakeven point in total billings if the billing rate is decreased by \$1 per hour, variable costs are decreased by \$.40 per hour, and fixed costs go down by \$3,600.

LO 6 Planning Future Sales:**LO 7 Contribution Margin Approach****REQUIRED**

- P 7.** Hans Echt is the president of the Ivers Plastics Division of Treat Industries. Management is considering a new product featuring a dashing medieval knight posed on a beautiful horse. Called Chargin' Knight, this product is expected to have global market appeal and become the mascot for many high school and university athletic teams. Expected variable unit costs are: direct materials, \$18.50; direct labor, \$4.25; production supplies, \$1.10; selling costs, \$2.80; and other, \$1.95. Annual fixed costs are: depreciation, building and equipment, \$36,000; advertising, \$45,000; and other, \$11,400. Treat Industries plans to sell the product for \$55.00.

1. Using the contribution margin approach, compute the number of products the company must sell to (a) break even and (b) earn a target profit of \$70,224.
2. Using the same data, compute the number of products that must be sold to earn a target profit of \$139,520 if advertising costs rise by \$40,000.
3. Using the original information and sales of 10,000 units, compute the new selling price the company must use to make a target profit of \$131,600. (**Hint:** Calculate contribution margin per unit first.)
4. According to the vice president of marketing, Stanley Mendoza, the most optimistic annual sales estimate for the product would be 15,000 units, and the highest competitive selling price the company can charge is \$52.00 per unit. How much more can be spent on fixed advertising costs if the selling price is \$52.00, if the variable costs cannot be reduced, and if the target profit for 15,000 unit sales is \$251,000?

LO 2 Cost Behavior and**LO 3 Projection for a****LO 8 Service Business**

- P 8.** Howard Painting Company, located in Summer Haven, specializes in refurbishing exterior painted surfaces. In the humid South, exterior surfaces are hit hard with insect debris. A special refurbishing technique, called pressure cleaning, is needed before the surface can be primed and repainted. The technique involves the following steps:

1. Unskilled laborers trim trees and bushes 2 feet away from the structure.
2. Skilled laborers clean the building with a high-pressure cleaning machine, using about 6 gallons of Debris-Luse per job.

3. Unskilled laborers apply a coat of primer.
4. Skilled laborers apply oil-based exterior paint to the entire surface.

On average, skilled laborers work 12 hours per job, and unskilled laborers work 8 hours.

The special pressure-cleaning and refurbishing process generated the following operating results during 20x1:

Skilled labor	\$20.00 per hour
Unskilled labor	\$8.00 per hour
Gallons of Debris-Luse used	3,768 gallons at \$5.50 per gallon
Paint primer	7,536 gallons at \$15.50 per gallon
Paint	6,280 gallons at \$16.00 per gallon
Paint spraying equipment	\$600.00 per month depreciation
Two leased vans	\$800.00 per month total
Rent for storage building	\$450.00 per month

The utilities costs for the year were as follows:

Month	Number of Jobs	Cost	Hours Worked
January	42	\$3,950	840
February	37	3,550	740
March	44	4,090	880
April	49	4,410	980
May	54	4,720	1,080
June	62	5,240	1,240
July	71	5,820	1,420
August	73	5,890	1,460
September	63	5,370	1,260
October	48	4,340	960
November	45	4,210	900
December	40	3,830	800
Totals	628	\$55,420	12,560

REQUIRED

1. Classify the costs as variable, fixed, or mixed.
2. Using the high-low method, separate mixed costs into their variable and fixed components. Use total hours worked as the basis.
3. Compute the average cost per job for 20x1. (Hint: Divide the total of all costs for 20x1 by the number of jobs completed.)

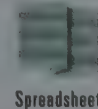
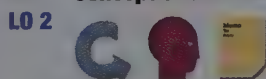
EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

- SD 1.** *Pacific Coast Shrimp Company* is a very small company. It owns an ice house and shrimp preparation building, a refrigerated van, and three shrimp boats. Steven Black inherited the company from his father three months ago. The company employs three boat crews of four people each and five processing workers. Willman and Yang, a local accounting firm, has kept the company's financial records for many years.

LO 1 Concept of Cost Behavior



In her last analysis of operations, Su Yang stated that the company's fixed cost base of \$100,000 is satisfactory for this type and size of business. However, variable costs have averaged 70 percent of sales over the last two years, a percentage that is too high for the volume of business. For example, last year only 30 percent of the company's sales revenue of \$300,000 contributed toward covering the fixed costs. As a result, the company reported a \$10,000 operating loss.

Black wants to improve the company's net income, but he is confused by Yang's explanation of the fixed and variable costs. Prepare a response to Black from Yang in which you explain the concept of cost behavior as it relates to Pacific Coast's operations. Include ideas for improving the company's net income based on changes in fixed and variable costs.

- LO 7** Comparison of Service
LO 8 Business Approaches to Sales Mix, Breakeven Concepts, and Performance Measures



SD 2.

Allstate Insurance Co. and **GEICO** are two well-known insurers of motorists. Allstate has agents and offices all over the country. GEICO sells only through the mail and over the Internet. In addition to collision and liability coverage for automobiles, each company offers life insurance and homeowners' insurance. When a motorist buys auto insurance from Allstate, the agent will usually offer life insurance and homeowners' insurance as well. This strategy usually leads to increased profitability for the company. Identify and discuss the role that fixed costs and sales mix contribution margin can play in increasing profitability. Suggest a performance measure that could be used to evaluate agents who sell auto insurance. What is the role of variable costs? Although GEICO usually sells its policies at lower prices than Allstate does, it is a very profitable company. What is it about the relationship of GEICO's fixed and variable costs that allows it to do this?

Group Activity: Divide the class into groups and have them discuss this SD. Ask one student from each group to summarize his or her group's discussion, and use the presentations as a lead-in to the coverage of Learning Objectives 7 and 8.

Ethical Dilemma

- LO 5** Breaking Even and Ethics



SD 3.

Cindy Ginsberg is the supervisor of the New Product Division of **Fricker Corp.**, located in Jackson, Wyoming. Ginsberg's annual bonus is based on the success of new products and is computed on the amount of sales over and above each product's projected breakeven point. In reviewing the computations supporting her most recent bonus, she found that a large order for 7,500 units of product WR4, which had been refused by a customer and returned to the company, had been included in the calculations. She later found out that the company's accountant had labeled the return an overhead expense and had charged the entire cost of the returned order to the plantwide Manufacturing Overhead account. The result was that product WR4 exceeded breakeven by more than 5,000 units and Ginsberg's bonus from that product amounted to over \$800. What actions should Ginsberg take? Be prepared to discuss your response.

Research Activity

- LO 2** Cost Behavior and
LO 3 Contribution Margin in a
LO 6 Fast-Food Restaurant



SD 4.

Make a trip to a local fast-food restaurant. Observe all aspects of the operation and take notes on the entire process. Describe the procedures used to take, process, and fill an order and deliver the food to the customer. Based on your observations, make a list of the costs incurred by the owner. Then identify at least three variable costs and three fixed costs. Can you identify any potential mixed costs? Why is the restaurant willing to sell a large drink for only a few cents more than a medium drink? How is the restaurant able to offer a "value meal" (for example, sandwich, large drink, and fries) for considerably less than those items would cost if they were bought separately? Bring your notes to class and be prepared to discuss your findings.

Decision-Making Practice

- LO 2** Mixed Costs
LO 3



SD 5.

Officials of the **Minnetonka Golf and Tennis Club** are putting together a budget for the year ending December 31, 20x6. A problem has caused the budget to be delayed by more than four weeks. Ray Lobo, the club treasurer, indicated that two expense items were creating the problem. The items were difficult to account for because they were called "mixed costs," and he did not know how to break them down into their

variable and fixed components. An accountant friend and golfing partner told him to use the high-low method to divide the costs into their variable and fixed parts.

The two cost categories are Electricity Expense and Repairs and Maintenance Expense. Information about last year's spending patterns and the activity measures related to each cost is shown below.

Month	Electricity Expense		Repairs and Maintenance	
	Amount	Kilowatt-Hours	Amount	Labor Hours
January	\$ 7,500	210,000	\$ 7,578	220
February	8,255	240,200	7,852	230
March	8,165	236,600	7,304	210
April	8,960	268,400	7,030	200
May	7,520	210,800	7,852	230
June	7,025	191,000	8,126	240
July	6,970	188,800	8,400	250
August	6,990	189,600	8,674	260
September	7,055	192,200	8,948	270
October	7,135	195,400	8,674	260
November	8,560	252,400	8,126	240
December	8,415	246,600	7,852	230
Totals	<u>\$92,550</u>	<u>2,622,000</u>	<u>\$96,416</u>	<u>2,840</u>

1. Using the high-low method, compute the variable cost rates that were used last year for each expense. What was the monthly fixed cost for electricity and for repairs and maintenance?
2. Compute the total variable cost and total fixed cost for each expense category for last year.
3. Lobo believes that for the coming year the electricity rate will increase by \$.005 and the repairs rate will rise by \$1.20. Usage of all items and their fixed cost amounts will remain constant. Compute the projected total cost for each category. How will those increases in costs affect the club's profits and cash flow?

MANAGERIAL REPORTING AND ANALYSIS

Interpreting Management Reports

- MRA 1.** *Nambe-Casa, Ltd.*, is an international importer-exporter of fine china. The company was formed in 1963 in Albuquerque, New Mexico. The company has distribution centers in the United States, Europe, and Australia. Although the company was very successful in its early years, its profitability has steadily declined. As a member of a management team selected to gather information for the next strategic planning meeting, you are asked to review the most recent income statement for the company. The income statement is at the top of the next page. Sales in 20x1 were 15,000 sets of fine china.

LO 4 Cost-Volume-Profit

LO 5 Analysis

LO 6



REQUIRED

1. For each set of fine china, calculate the (a) selling price, (b) variable purchases cost, (c) variable distribution cost, (d) variable sales commission, and (e) contribution margin.
2. Calculate the breakeven point in units and in sales dollars.

Nambe-Casa, Ltd.
Contribution Income Statement
For the Year Ended December 31, 20x1

Sales revenue		\$13,500,000
Less variable costs		
Purchases	\$6,000,000	
Distribution	2,115,000	
Sales commissions	1,410,000	
Total variable costs		9,525,000
Contribution margin		\$ 3,975,000
Less fixed costs		
Distribution	\$ 985,000	
Selling	1,184,000	
General and administrative	871,875	
Total fixed costs		3,040,875
Operating income		<u>\$ 934,125</u>

3. Historically, variable costs should be about 60 percent of sales. What was the ratio of variable costs to sales for 20x1? List three actions Nambe-Casa could take to correct the difference.
4. How would fixed costs have been affected if Nambe-Casa had sold only 14,000 sets of fine china?

Formulating Management Reports

MRA 2.

LO 7 Cost-Volume-Profit Analysis



Refer to the information in MRA 1. In January 20x2, Laura Casa, the president and chief executive officer of Nambe-Casa, Ltd., conducted a strategic planning meeting with her officers. Below is a summary of the information provided by two of the officers.

Rita O'Toole, vice president of sales: A review of the competitors indicates that the selling price of a set of china should be lowered to \$890. We plan to sell 15,000 sets of fine china again in 20x2. To encourage increased sales, we should raise sales commissions to 12 percent of the selling price.

Maurice Moonitz, vice president of distribution: We have signed a contract with a new shipping line for foreign shipments. We will be able to reduce the fixed distribution costs by 10 percent and reduce variable distribution costs by 4 percent.

Laura Casa needs your help. She is concerned that the changes may not improve operating income sufficiently in 20x2. If operating income does not increase by at least 10 percent, she will want to find other ways to reduce the company's costs. Because the new year has already started and changes need to be made quickly, she requests your report within five days.

REQUIRED

1. Prepare an estimated contribution income statement for 20x2. Your report should show the budgeted (estimated) operating income based on the information provided above and in MRA 1. Will the changes improve operating income sufficiently? Explain.
2. In preparation for writing your report, answer the following questions:
 - a. Why are you preparing the report?
 - b. Who needs the report?
 - c. What were the sources of information for your report?
 - d. When is the report due?

LO 4 C-V-P Analysis and Decision Making**MRA 3.****International Company**

The *Goslar Corporation* cuts stones used in the construction and restoration of cathedrals throughout Europe. Granite, marble, and sandstone are cut into a variety of dimensions for walls, ceilings, and floors. The German-based company has operations in Italy and Switzerland. Otto Schrock, the controller, recently determined that the breakeven point was \$325,000 in sales. In preparation for a quarterly planning meeting, Schrock must provide information for the following six proposals, which will be discussed individually by the planning team.

- Increase the selling price of marble slabs by 10 percent.
- Change the sales mix to respond to the increased sales demand for marble slabs. As a result, the company would increase production of marble slabs and decrease the production and sales of sandstone, the least profitable product.
- Increase fixed production costs by \$40,000 annually for the depreciation of new stone-cutting equipment.
- Increase the variable costs by 1 percent for increased export duties on foreign sales.
- Decrease the sales volume of the sandstone slabs because of political upheavals in eastern Europe.
- Decrease the number of days that a customer can wait before paying without being charged interest.

REQUIRED

- For each proposal, determine if cost-volume-profit (C-V-P) analysis would provide useful financial information.
- Indicate whether each proposal that lends itself to C-V-P analysis would show an increase, decrease, or no impact on profit. Consider each decision separately and assume sales volume is not affected.

Excel Spreadsheet Analysis**MRA 4.****LO 7 Planning Future Sales**

Refer to the information in **MRA 2**. In January 20x2, Laura Casa gathered information about a decrease in the selling price of a set of china to \$890, an increase in sales commissions to 12 percent of the selling price, a decrease in fixed distribution costs of 10 percent, a decrease in variable distribution costs of 4 percent, and planned sales of 15,000 sets. Based on an analysis of this information, she found that Nambe-Casa would not increase its 20x2 operating income by at least 10 percent over the previous year's income.

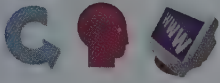
Rita O'Toole reported that a new salesperson had just obtained a sales contract with an Australian distributor for 4,500 sets of china. The selling price, variable purchases cost per unit, 12 percent sales commission, and total fixed costs will be the same, but the variable distribution costs will be \$160 per unit.

REQUIRED

Using an Excel spreadsheet, complete the following:

- Calculate the target operating income for 20x2.
- Prepare a contribution income statement for 20x2 based on the information presented in **MRA 1** and the adjustments presented in **MRA 2**. Do you agree with Laura Casa that Nambe-Casa's projected operating income for 20x2 will be less than the operating income for 20x1? Explain.
- Calculate the total contribution margin from the Australian sales.
- Prepare a revised contribution income statement for 20x2 by combining the information from 2 and 3 above.
- Does Nambe-Casa need the Australian sales to achieve its target operating income for 20x2?

LO 6 Projecting Revenues and
LO 7 Costs



MRA 5.

Internet Case

Select a company on the Internet or refer to the Needles Accounting Resource Center web site at <http://college.hmco.com> for links to selected companies. Study the Letter to the Stockholders in the most recent annual report for the company you have chosen. Many initiatives or actions discussed in that section were part of the company's strategic plan and were included in planning activities for the year. Identify at least three initiatives or actions that you believe were part of the company's planning activities for the year that affected sales or costs. Also identify one initiative or action that the company is planning for the coming year that you would expect to affect revenue or expenses for next year.

ENDNOTE

1. Linda Hall and Jane Lambert, "Cummins Engine Changes Its Depreciation," *Management Accounting*, Institute of Management Accountants, July 1996.

24

The Budgeting Process

LEARNING OBJECTIVES

- 1** Define *budgeting* and explain its role in the management cycle.
- 2** Describe the master budget process for different types of organizations, and list the guidelines for preparing budgets.
- 3** Prepare a budgeted income statement and supporting operating budgets.
- 4** Prepare a cash budget.
- 5** Prepare a budgeted balance sheet.



DECISION POINT: A MANAGER'S FOCUS



The HON Company The HON Company, the largest manufacturer of mid-priced office furniture in the United States and Canada, wants to improve productivity and customer service while developing new products and services. However, balancing gradual improvements with innovation is difficult. The HON Company, one of nine subsidiaries of HON Industries, operates as a profit center. The managers of HON Company are responsible for generating profits and managing resources in accordance with its parent company's strategic plan. The company feels tremendous pressure to compete in an industry that has a few major customers who want good quality, low prices, and on-time delivery. To manage costs and make full use of production capacity, managers at the HON Company use a process called continuous quarterly budgeting to implement their budgets. At the beginning of each quarter, teams work to create a four-quarter budget. Through this budgeting process, top management expects to motivate the various departments to continuously improve productivity and reduce delivery time while planning the introduction of new products and variations of existing products.¹

How does the quarterly budget process work? First, a team from sales and marketing develops a sales budget by product, geographic territory, and distribution channel. The president and senior staff review the sales budget to see that it meets the goals of the strategic plan. Second, the scheduling team prepares a production and shipping schedule to coordinate those activities at the different manufacturing plants. Third, the managers responsible for each of the five functional areas (research and development; production; distribution; customer service; and selling, general, and administrative) prepare cost/expense budgets. Fourth, the company accounting group reviews the budgets and analyzes the contents to ensure that the budgets reflect the strategic plan. Fifth, the HON Company controller prepares a complete set of budgeted financial statements and additional information, including productivity measures, budgeted sales attributable to new product introductions, and major equipment expenditures.

The process of preparing quarterly budgets has proved to be very valuable for HON Company. The continuous budgeting process informs employees about new products and procedures and permits improvements to occur more quickly. Continuous quarterly budgeting successfully connects strategic planning to operations by helping the workers see the corporate vision, target their actions to support the vision, and monitor the results of their actions. Continuous quarterly budgeting helps the managers and employees of the HON Company to continuously improve productivity and customer service while integrating innovation through the development of new products.

VIDEO CASE



Enterprise Rent-A-Car

Objectives

- To become familiar with the budgeting process and budgets
- To understand the relationship between strategic plans and operating budgets
- To describe the role of budgeting in the management cycle

Background for the Case

Because its core business is not the airport market, Enterprise Rent-A-Car does not have the high profile most



of its competitors enjoy; however, with over \$5.6 billion in annual revenues (revenue growth of about 20 percent per year for the last 11 years) and more than 4,400 locations, it is the largest car rental company in North

America and one of the top 50 privately owned companies.

The 44-year old company focuses on the home-city market, which is divided into two segments. The first segment serves people who need replacement vehicles when their own cars are not available—for instance, when they are scheduled for lengthy repair work. The second segment serves people with discretionary needs for another or different type of car for a short period, such as for a weekend trip or vacations.

Enterprise prides itself on providing excellent customer service, including free pickup from a customer's home, office, or repair shop. The company accomplishes its goals by providing incentives to motivate employees, coupled with a decentralized organization that allows great latitude in decision making. Enterprise's managers prepare budgets to integrate, coordinate, and communicate the operating plans necessary to achieve these strategic objectives. The budgeting system must allow measurement of performance for each location and each employee. Good systems and budgeting also facilitate the company's objective of expanding into global markets in Canada, the United Kingdom, and Germany.



For more information about Enterprise Rent-A-Car, visit the company's web site through the Needles Accounting Resource Center at

<http://college.hmco.com>

Required



View the video on Enterprise Rent-A-Car that accompanies this book. As you are watching the video, take notes related to the following questions:

1. As part of the planning process, many large, successful companies prepare budgets. In your own words, explain what a budget is and list all the reasons you believe a company like Enterprise would prepare a set of budgets.
2. Companies that prepare strategic plans also prepare budgets. What is the relation between Enterprise's strategic plans and its operating budgets?
3. What is the role of budgeting in the management cycle?

The Budgeting Process

OBJECTIVE

1 Define *budgeting* and explain its role in the management cycle

Planning is an important ongoing process for organizations. A review of the current use of available resources for financing, investing, and operating activities is necessary to plan for the efficient use of future resources. **Budgeting** is the process of identifying, gathering, summarizing, and communicating financial and nonfinancial information about an organization's future activities. The budgeting process provides managers with the opportunity to carefully match the goals of the organization with the resources necessary to accomplish those goals.

A **budget** is a plan of action that forecasts future transactions, activities, and events in financial or nonfinancial terms. Budgets are synonymous with managing an organization. The term *organization* is important because budgets are used in government and not-for-profit organizations (such as hospitals, universities, professional organizations, and charities) as well as in profit-oriented businesses. All types of organizations rely on plans to help them accomplish their objectives. All types of organizations have managers whose responsibilities are determined by top management or a board of directors; budgets are used to plan for and assess those areas of responsibility and to measure managers' performance.

All organizations need cash to purchase resources in order to accomplish their goals. Whenever cash needs to be managed and accounted for, budgets are used. Budgets establish (1) minimum desired, or target, levels of cash receipts and (2) limits on the spending of cash for particular purposes. The primary difference between not-for-profit organizations and profit-oriented organizations is that a profit-oriented organization sells a product or service for the purpose of making a profit. Profit-oriented organizations often use the term *profit planning* rather than *budgeting*.

Budgets can be used to communicate information, coordinate activities and resource usage, motivate employees, and evaluate performance. Budgets come in many forms. Some budgets present financial information based on the availability of resources. Such budgets should reflect a fair assignment of resources to the different organizational activities over a future period. For example, a cash budget shows the planned use of cash resources for operating, investing, and financing activities. Other budgets show planned activities to meet certain requirements or standards established in the planning stage. For example, a production budget shows planned production in units.

The budgeting process is as important in today's globally competitive operating environment as it is in more traditional settings. In fact, budgeting becomes even more important when just-in-time (JIT) or total quality management (TQM) concepts are applied and when computers and other electronic operating and data-gathering devices are used. In such cases, actual operating data are made available quickly, and budgets are updated continuously to accommodate management's need for performance evaluation.

Budgeting and Goals

LONG-TERM GOALS Annual operating plans cannot be made unless the people preparing the budget know the direction that top management expects the organization to take. Long-term goals, which are projections covering a five- to ten-year period, must be set by top management. Those goals should take into consideration economic and industry forecasts, employee-management relations, and the structure and role of management in leading the organization. They should include statements about the expected quality of products or services, growth rates, and desired market share.



Managers need to develop a strong ethical culture within their organizations so that they can minimize unethical or illegal activities. Unethical behavior in organizations hurts business. As employee productivity and loyalty decrease, employee turnover and absenteeism increase. Employees may also become lax in their compliance with organizational policies and procedures and, for example, fail to adhere to budgets and use them properly. As a result, the organization may project a poor image to customers, suppliers, and the community. Organizations can spend as

much as \$5,000 per employee on efforts to control unethical behavior. To avoid such costly problems and foster an ethical culture in their organizations, managers can:

- Develop a code of ethics that communicates the organization's ethical values.
- Increase employee awareness of ethical behavior through training programs.
- Provide a process to guide employees when they are facing an ethical dilemma.
- Develop a process to promote, monitor, and positively influence the ethical behavior of the organization's employees.
- Personally demonstrate ethical behavior.²

Vague aims are not sufficient. The long-term goals should set specific targets and expected timetables and name the people responsible for achieving the goals. For example, assume that a company currently holds only 4 percent of its product's market share. The company's long-term goals may state that the vice president of marketing is to develop plans and strategies to ensure that the company controls 10 percent of the market in five years and increases its share to 15 percent by the end of ten years.

Once all goals have been developed, they should be compiled into a total long-term strategic plan. That plan should include a range of targets and goals and give direction to the company's efforts to achieve those goals. It should include future profit projections and describe new products and services in general terms.

SHORT-TERM GOALS The long-term goals must be carefully developed because they are used to prepare yearly operating plans and targets. The short-term plan involves every part of the enterprise and is much more detailed than the long-term goals. To arrive at the short-term plan, the long-term goals must be restated in terms of what should be accomplished during the next year. Decisions must be made about sales and profit targets by product or service, human resource needs and expected changes, and plans for introducing new products or services. The resulting short-term targets and goals form the basis for the organization's operating budget for the year.

Once management has set the short-term goals, the controller or budget director takes charge of preparing the budget. This person designs a complete set of budget-development plans and a timetable with deadlines for all parts of the year's operating plan. Specific people must be named to carry out each part of the budget's development, and their responsibilities, targets, and deadlines must be clearly described.

THE IMPORTANCE OF PARTICIPATION The success of a budget strongly depends on how well the organization handles the human aspects of the budgeting process. All appropriate people, from top managers to first-line supervisors, must participate actively and honestly in preparing the budget. Such cooperation will occur only if each person realizes that he or she is important to the process.

The budget director plays a crucial role in the development of an effective budgeting system. This person must be able to communicate with people at all levels

of the organization. Top management presents the budget targets and organizational goals to the budget director. The budget director then communicates those targets and goals to relevant managers throughout the organization. If the managers detect potential problems, they notify the budget director, who analyzes the information and passes it along to top management. In light of the new data, top management reassesses and restructures the targets and goals. It then gives the revised targets and goals to the budget director, and the process begins again. The budget director is at the center of the budgeting process, collecting and distributing information and coordinating all the budgeting activities.

The budget director depends on the cooperation of the other participants in the budgeting process. Those people must be carefully identified and informed of their responsibilities. The identification process begins with the senior managers. They choose the people who, under their supervision, will actually prepare the data. Because an organization's main activities—such as engineering, production, sales, and employee training—take place at its lower levels, information must flow from the supervisors of those activities through middle managers to senior executives. Each person in the chain of communication plays a part in both developing and implementing the budget. Thus, the key to success is **participative budgeting**, a process in which personnel at all levels of an organization meaningfully and actively take part in the creation of budgets. If every manager has a voice in setting the goals for his or her unit, every manager will feel personally motivated to ensure the success of the budgeting process.

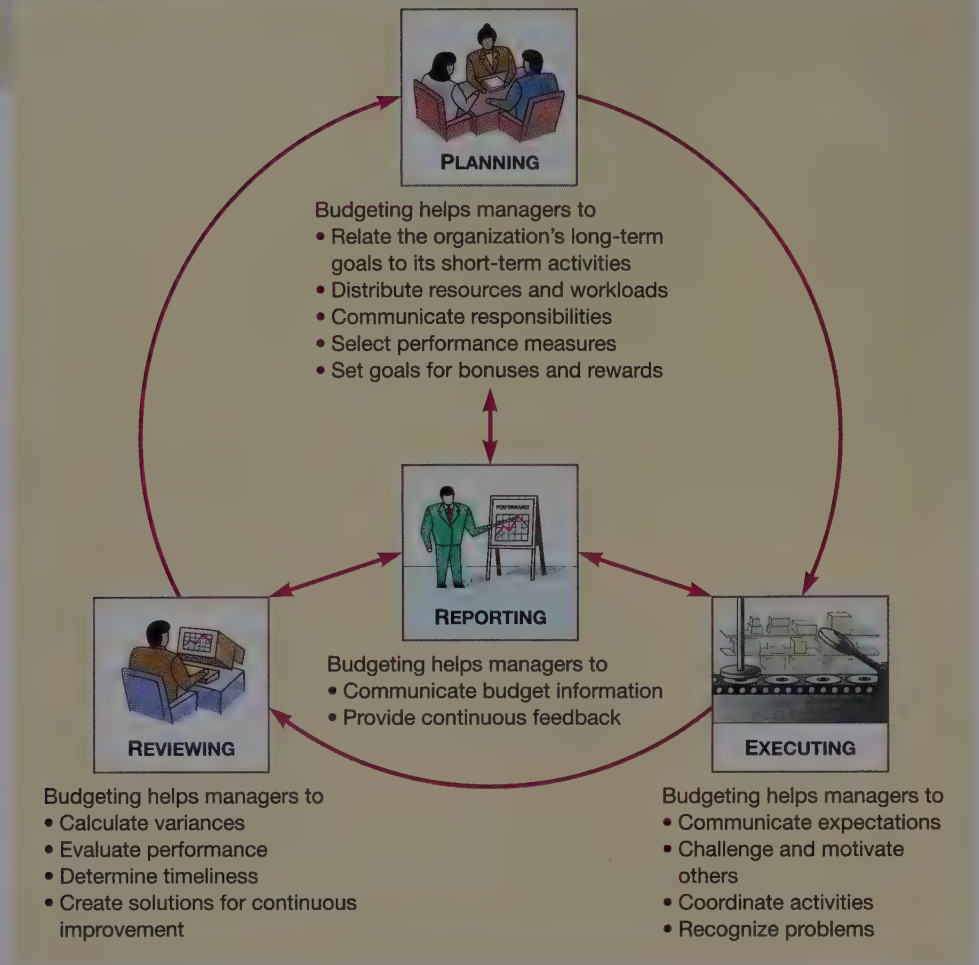
Top management must be sensitive to its role in the budgeting process. Senior executives who dictate goals and expect employees at lower levels of the organization to implement them are not practicing participative budgeting. Such dictated targets are often difficult to attain, and managers at operational levels may not be motivated to achieve such goals if they had no input in preparing the goals. Problems may also arise if top management allows the budget director to develop the budget without consulting other managers. In that case, managers may feel that budgeting is not a top priority and that budgets need not be taken seriously. Such difficulties can be avoided if top management recognizes the importance of communicating its support for the budgeting process and of allowing managers at all levels to play meaningful roles in the development of their budgets.

Budgeting and the Management Cycle

To achieve the goals of profitability and liquidity, managers of many organizations use the budgeting process throughout the management cycle to help them plan, execute, review, and report the organization's financing, investing, and operating activities. Figure 1 illustrates the relationships between budgeting and the management cycle. Budgets originate in the planning stage, which is the stage emphasized in this chapter. Budgeting activities at Hi-Flyer Company, a manufacturer of flying disks used for recreation and tournament play, illustrate the relationship between budgeting and the management cycle. The owner, Skye King, believes that the future growth of Hi-Flyer Company depends on a good budgeting process.

PLANNING The planning process includes the development of long-term and short-term plans to achieve important success factors, such as high-quality products, reasonable cost, and timely delivery. Skye King believes that budgets help his organization's managers match long-term goals with short-term business activities by carefully distributing workloads and resources throughout the organization, such as to specific products, departments, sales territories, and activities. Because he recognizes the importance of participative budgeting, King includes managers from all levels of the organization in the budgeting process. Budget teams use budget

Figure 1
Budgeting and the Management
Cycle



information to communicate responsibilities to the individuals who are accountable for a particular segment of the organization. Careful selection and introduction of performance measures can challenge and motivate individuals or teams to achieve goals and earn bonuses and rewards for their efforts. Senior management recently selected profits, number of units sold, and cycle time (the time to take, manufacture, and ship a sales order) as measures of performance for granting bonuses to individuals and teams at Hi-Flyer Company.

EXECUTING During the executing stage, managers use budget information for communication, benchmarking, and problem recognition. The managers of Hi-Flyer Company use budget information daily, weekly, and monthly to communicate expectations about the performance of activities and the availability of resources for segments of the organization. For example, Abe Dillon, the production manager, uses the planned units of production as an operating target for the production employees. He has also established the number of defective flying disks as a performance measure to motivate workers to manufacture quality products. In addition, Skye King uses standard product costs, generated during the budget process, to submit bids for sales orders, estimate profits, and calculate the expected profitability of a product during the operating period.

REVIEWING In the reviewing stage, managers calculate variances, evaluate performance, review the timeliness of activities performed, and create solutions for

FOCUS ON BUSINESS TECHNOLOGY

When an organization decides to market its products or services on the Internet's World Wide Web, it must create a web site and build the site's costs into its budget. Developing a web site includes making decisions about access to the Internet, content on the site (online brochures or product news), graphic design, and func-

tionality. In addition to basic development costs, the organization will incur costs for faster connections, data-base applications that update information easily, and animations and three-dimensional logos. After the web site has been developed, additional costs include monthly site maintenance fees, data-base development, and network integration. In addition, U.S. organizations that choose to use a custom domain server pay a yearly licensing fee to Internic, a government agency that oversees Internet activity.

continuous improvement. As mentioned earlier, Hi-Flyer's managers use the performance measures developed during the planning stage as targets for actual performance during the executing stage. By comparing the budget and actual information, they can identify variances between planned and actual activity. They review the variances to identify both waste and savings in production, sales, purchasing, packing, shipping, accounting, and other business activities. If problems are identified, the managers can work together to find solutions that will enable the organization to continuously improve its products and processes. Hi-Flyer's managers perform budget analyses on a regular basis because doing so helps them chart the course of future operations and evaluate past performance. If Hi-Flyer Company establishes realistic goals, then comparing the actual results with budgeted targets can help management assess how well the organization performed.

REPORTING The reporting stage occurs throughout the year because managers need to continuously report on budget information and provide feedback about the organization's operating, investing, and financing activities. Budgets are reports showing plans for future actions. As such, they serve as a reference point for many other reports. For example, performance reports based on budget information support bonuses and promotions. Other budget-based reports support operating decisions. In this chapter, we will focus on how budgets are prepared during the planning stage.

The Master Budget

OBJECTIVE

2 Describe the master budget process for different types of organizations, and list the guidelines for preparing budgets

Suppose you want to start a new business, but first you must obtain a bank loan to supply some of the cash you need to begin operations. Before the bank will agree to loan you money, you must demonstrate that you can repay the principal and interest with cash generated by profitable operations. To do so, you will prepare a set of budgeted, or pro forma, financial statements for the bank to review. Now assume that you receive the bank loan and that, over ten years, your company becomes successful. Every year you will continue to prepare a set of budgeted financial statements so that you can match long-term goals to short-term activities and plan for the resources necessary to operate, finance, and invest in your business.

A **master budget** is a set of budgets that consolidates an organization's financial information into budgeted financial statements for a future period of time. A

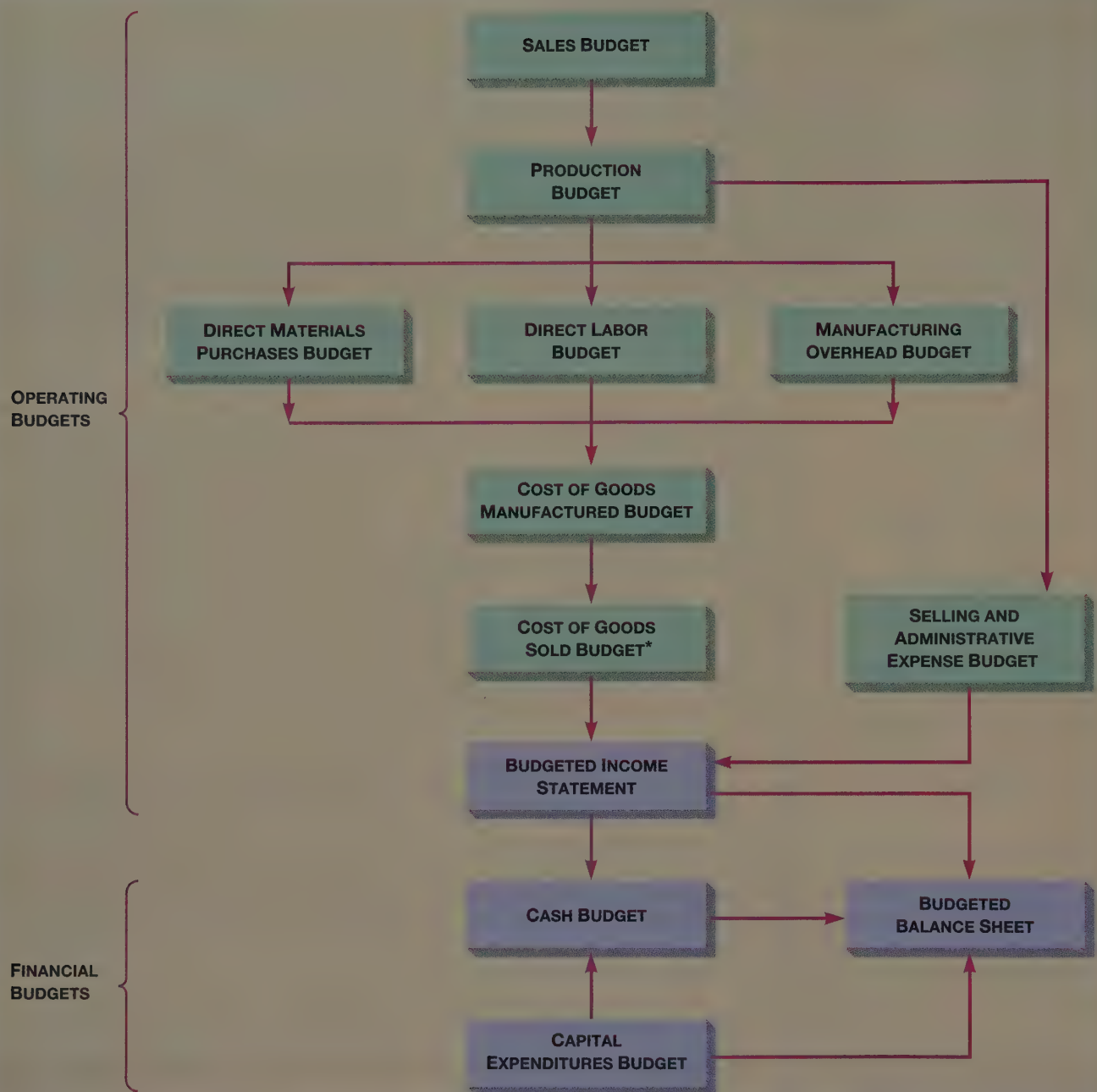
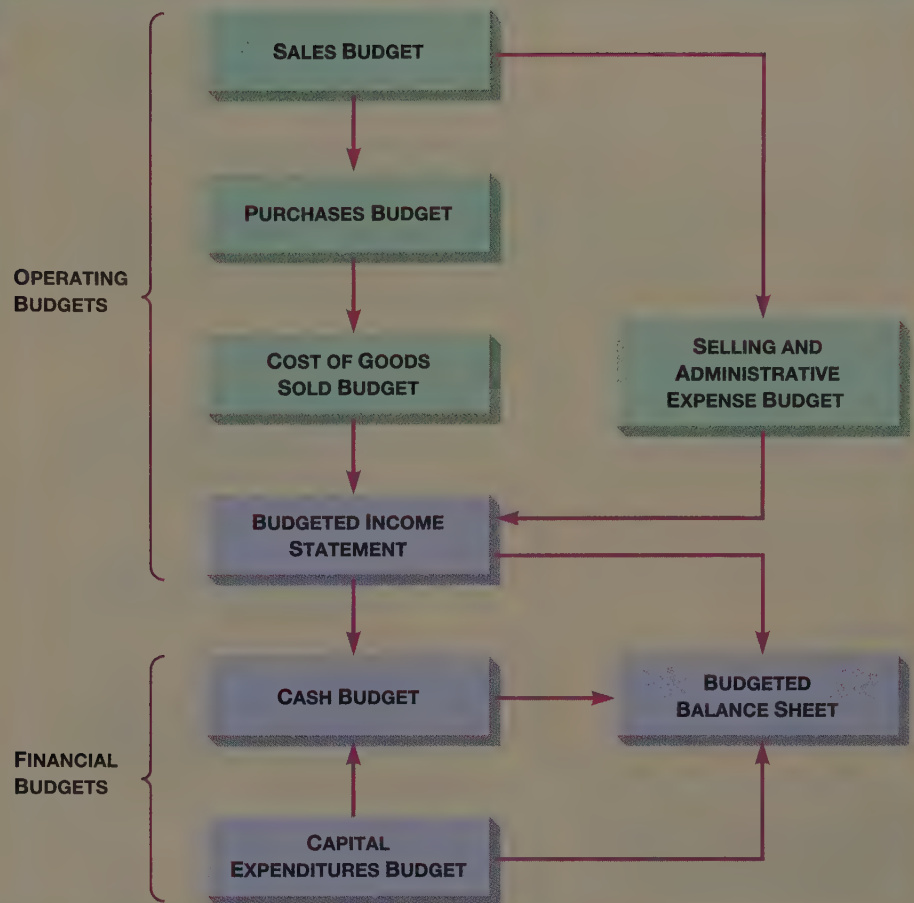


Figure 2
Preparation of a Master Budget
for a Manufacturing
Organization

*Some organizations choose to include the cost of goods sold budget in the budgeted income statement.

master budget includes a set of operating budgets that supports a budgeted income statement. In addition, a master budget presents a set of financial budgets that includes a budgeted balance sheet, a cash budget, and a capital expenditures budget. Regardless of the type of organization, the master budget provides helpful information for planning, executing, reviewing, and reporting organizational activities. Figures 2, 3, and 4 display the preparation of a master budget for a manufacturing organization, a retail organization, and a service organization, respectively.

Figure 3
Preparation of a Master Budget for
a Retail Organization



The master budget process has some similarities in all three types of organizations. All three types of organizations need a set of operating budgets to support the budgeted income statement. The information from the operating budgets and the capital expenditures budget affects the cash budget and the budgeted balance sheet. The cash budget also provides information for the budgeted balance sheet.

The main difference in the master budget process for the three types of organizations involves the preparation of operating budgets for the budgeted income statement. The operating budgets for manufacturing organizations like Intel or John Deere include budgets for sales, production, direct materials purchases, direct labor, manufacturing overhead, cost of goods manufactured, and selling and administrative expenses. The preparation of those budgets for a manufacturing organization will be explained under the next learning objective.

Retail organizations like J.C. Penney or Home Depot must know what products to sell, the estimated quantities to be sold, and the selling price for each. This helps the organization plan the amount of resources needed to sell the merchandise. A retail organization must purchase merchandise for resale and incur expenses for employee payroll, utilities, taxes, insurance, rent, advertising, sales commissions, accounting, and other expenses. To manage the use of those resources, retail managers and accountants prepare operating budgets to support a budgeted income statement. The operating budgets for a retail organization include a sales budget, a purchases budget, a cost of goods sold budget, and a selling and administrative expense budget. The sales budget is prepared first because it is used to estimate

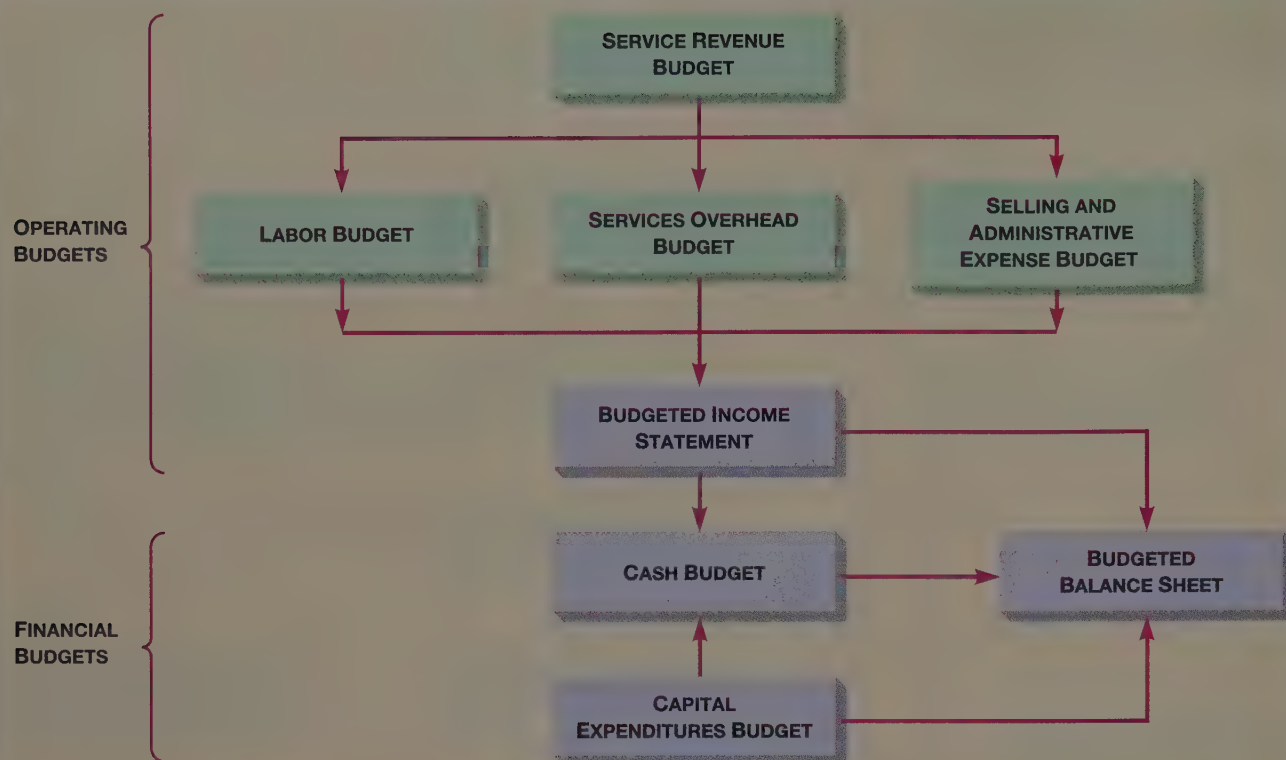


Figure 4
Preparation of a Master Budget
for a Service Organization

sales volume and revenues. Once managers know how many sales dollars to expect and the quantity of goods to be sold, they can develop other budgets that will enable them to manage the organization's resources so that they can generate profits on those sales. The purchases budget determines the quantity of merchandise needed to meet the sales demand and maintain a minimum level of inventory.

Rather than manufacture and sell products, service organizations such as Union Pacific Railroad or Columbia Healthcare invest money in human resources to provide services. Managers of service organizations must know the types and amounts of services to perform. Managers must also know the labor hours needed to complete those services, the level of expertise of their employees, and the labor rates for the planned services. In addition, service organizations must incur costs for utilities, taxes, insurance, rent, advertising, accounting, and other expenses.

A service organization also prepares a set of operating budgets to support the budgeted income statement. The operating budgets include budgets for service revenue, labor, services overhead, and selling and administrative expenses. The labor budget reflects the estimated labor hours and labor rates to provide the services. The managers use that information to estimate the amount of human and technical resources needed for the accounting period and to set prices for services.

Guidelines for Budget Preparation

Attention to the suggestions presented in Table 1 will help managers improve the quality of the budgets they prepare. Managers need to know why the budget is being prepared, who will read and use it, how the information will be presented, and where the information can be found. Meaningful, accurate information is gathered from appropriate documents or interviews with the employees, suppliers, or

Table 1. Guidelines for Budget Preparation

Know the purpose of the budget.
 Identify the user group and their information needs.
 Begin the budget with a clearly stated title or heading.
 Identify the format for the budget, and use appropriate formulas and calculations to derive the quantitative information.
 Label the budget's components, and list the unit and financial data in an orderly manner.
 Know the sources of budget information.
 Revise the budget until all planning decisions are included.

managers who are responsible for the related areas. The title includes the organization's name, the type of budget, and the accounting period under consideration. Several revisions may be required before the final version is ready to distribute.

The Operating Budgets

OBJECTIVE

3 Prepare a budgeted income statement and supporting operating budgets

Procedures for preparing a master budget vary from one organization to another. Because it is impossible to cover all procedures found in actual practice, the following discussion will illustrate one approach to preparing a budgeted income statement and supporting operating budgets for a manufacturing organization. Remember that by applying the tools of cost behavior and cost-volume-profit analysis and by working with a particular product costing method, you can prepare any kind of budget. We have already stated that there is no standard format to use for budget preparation; the only universal requirements are that the budget must be clear and understandable and that it must communicate the intended information to the reader.

THE SALES BUDGET

The beginning point for the preparation of the master budget is the sales budget. The **sales budget** is a detailed plan, expressed in both units and dollars, that identifies expected product (or service) sales for a future period. Sales managers use this information to plan sales- and marketing-related activities and to determine human, physical, and technical resource needs. Accountants use the information to determine estimated cash receipts for the cash budget. To prepare the sales budget, management must know the estimated selling price per unit and the estimated sales demand in units. The sales budget uses the following equation to determine the total budgeted sales:

$$\begin{array}{rcccl} \text{Total} & & \text{Estimated} & & \text{Estimated} \\ \text{Budgeted} & = & \text{Selling Price} & \times & \text{Sales in} \\ \text{Sales} & & \text{per Unit} & & \text{Units} \end{array}$$

Although the calculation is easy, selecting the best estimates for the selling price and the sales volume can be difficult. The estimated selling price may be the current selling price, or it may change in response to such factors as competition. An estimated selling price below the current selling price may be needed if competitors are currently selling the same product at lower prices or if the organization wants to increase its share of the market. On the other hand, the organization may plan to sell at a higher price because the product's quality has increased as a result of improved materials or production processes.

In addition, the estimated sales volume is very important because it will affect the level of operating activities and the amount of resources necessary to operate.

Exhibit 1
Sales Budget

Hi-Flyer Company
Sales Budget
For the Year Ended December 31, 20x1

	Quarter				Year
	1	2	3	4	
Sales in Units	10,000	30,000	10,000	40,000	90,000
× Selling Price per Unit	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5
Total Sales	<u>\$50,000</u>	<u>\$150,000</u>	<u>\$50,000</u>	<u>\$200,000</u>	<u>\$450,000</u>

Production, packing, shipping, accounting, purchasing, selling, and administrative activities require resources that will increase in varying degrees with increases in the estimated sales volume. A sales forecast can help to determine an estimated sales volume. A **sales forecast** is a projection of sales demand (the estimated sales in units) based on an analysis of external and internal factors. External factors influencing a sales forecast include:

1. The state of the local and the national economies
2. The state of the industry's economy
3. The nature of the competition, their sales volume, and their selling price

Internal factors influencing a sales forecast include:

1. The number of units sold in prior periods
2. The organization's credit policies
3. The organization's collection policies
4. The organization's pricing policies
5. Any new products the organization plans to introduce into the market
6. The capacity of the organization's manufacturing facilities

Exhibit 1 illustrates the sales budget for Hi-Flyer Company. The sales budget states sales information for the Hi-Flyer products in both units and dollar revenue amounts for each quarter and for the entire year. The estimated selling price is \$5 per unit in response to the highly competitive marketplace. The sales forecast shows highly seasonal sales activity that causes the estimated sales volume to fluctuate between 10,000 and 40,000 Hi-Flyers per quarter in 20x1. If Hi-Flyer Company sold more than one product, separate schedules or a comprehensive sales budget could be prepared to show the total budgeted sales by product.

THE PRODUCTION BUDGET The **production budget** is a detailed schedule that identifies the products or services that must be produced or provided to meet budgeted sales and inventory needs. Production managers use this information to plan for the materials and human resources needed to complete production-related activities. To prepare this budget, management must know the sales target in units (see the sales budget in Exhibit 1) and the desired level of ending finished goods inventory for each period. The desired level of ending finished goods inventory is often stated as a percentage of the next period's budgeted unit sales. For example, Hi-Flyer Company's desired level of ending finished goods inventory is 10 percent of the next quarter's unit sales of Hi-Flyers.

Exhibit 2
Production Budget

Hi-Flyer Company
Production Budget
For the Year Ended December 31, 20x1

	Quarter				Year
	1	2	3	4	
Sales in Units (Exhibit 1)	10,000	30,000	10,000	40,000	90,000
Add Desired Units of Ending Finished Goods Inventory	3,000	1,000	4,000	1,500	1,500
Desired Total Units	13,000	31,000	14,000	41,500	91,500
Less Desired Units of Beginning Finished Goods Inventory	1,000	3,000	1,000	4,000	1,000
Total Production Units	12,000	28,000	13,000	37,500	90,500

Note 1: Desired units of ending finished goods inventory = 10% of *next* quarter's budgeted sales.

Note 2: Desired units of beginning finished goods inventory = 10% of *current* quarter's budgeted sales.

Note 3: Assume that budgeted sales for the first quarter of 20x2 = 15,000 units.

The following formula identifies the production needs for each accounting period.

$$\begin{array}{rclclcl}
 \text{Total} & & \text{Budgeted} & & \text{Desired Units} & & \text{Desired Units of} \\
 \text{Production} & = & \text{Sales in} & + & \text{of Ending} & - & \text{Beginning} \\
 \text{Units} & & \text{Units} & & \text{Finished} & & \text{Finished} \\
 & & & & \text{Goods} & & \text{Goods} \\
 & & & & \text{Inventory} & & \text{Inventory}
 \end{array}$$

FOCUS ON INTERNATIONAL BUSINESS

An organization selling in foreign markets must consider each market's special characteristics when developing a sales budget. The differences among regions and countries require the preparation of a separate sales budget for each market. Here are some examples of factors a company must consider when marketing abroad.³

Region/Country	Dominant and Distinctive Market Characteristic
Canada	North American Free Trade Agreement
Eastern Europe	Recent democratization and uncertain trade regulations
France	Price controls
Japan	Complex distribution system
Pacific Rim	New area with many developing countries offering a growing consumer base

Exhibit 2 illustrates the production budget for Hi-Flyer Company. Notice that each quarter's desired total units of ending finished goods inventory becomes the next quarter's desired total units of beginning finished goods inventory. If we assume that budgeted sales for the first quarter of 20x2 is 15,000 units, then the ending finished goods inventory for the fourth quarter of 20x1 will be 1,500 units ($.10 \times 15,000$ units). This amount also represents the desired total units of ending finished goods inventory for 20x1. The 1,000 units in the beginning finished goods inventory for the first quarter is also the desired total units of beginning finished goods inventory for the year 20x1.

A production budget for a service organization will show the required labor hours to generate the planned revenues for each period. Organizations that manufacture a variety of products or provide many different types of services may prepare either separate schedules for each product or service or one comprehensive production budget. This information helps managers to schedule production and service activities.

THE DIRECT MATERIALS PURCHASES BUDGET The **direct materials purchases budget** is a detailed schedule that identifies the purchases required for budgeted production and inventory needs as well as the costs associated with those purchases. The purchasing function uses this information to plan purchases of direct materials, and the accountant uses the same information to estimate cash payments to suppliers. Thus, this budget reflects both the quantity and the cost of direct materials purchases.

To prepare this budget, management must know the production needs (see the production budget in Exhibit 2), the desired level of the direct materials inventory for each period, and the estimated per-unit cost of direct materials. The desired level of ending direct materials inventory is usually stated as a percentage of the next period’s production needs. In our example, Hi-Flyer Company’s desired level of ending direct materials inventory is 20 percent of the next quarter’s production needs.

The first step in preparing this direct materials purchases budget is to calculate the total production needs in ounces because the Hi-Flyer flying disk requires 10 ounces of plastic per disk. The total number of ounces needed for production for the quarter is found by multiplying the number of Hi-Flyer disks budgeted for production in the quarter by 10 ounces of plastic per disk. In the second step, the following formula is used to determine the direct materials purchases in units for each accounting period in the budget.

Total Units of Direct Materials to Be Purchased	=	Total Production Needs in Units of Direct Materials	+	Desired Units of Ending Direct Materials Inventory	–	Desired Units of Beginning Direct Materials Inventory
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The third step is to calculate the cost of the direct materials purchases by multiplying the total unit purchases of direct materials by the direct materials cost of \$.05 per ounce (the cost that was estimated by the Purchasing Department). Exhibit 3 illustrates the direct materials purchases budget for Hi-Flyer Company. Notice that each quarter’s desired units of ending direct materials inventory becomes the next quarter’s desired units of beginning direct materials inventory. If we assume that the budgeted amount for the first quarter of 20x2 is 150,000 ounces, then the ending direct materials inventory for the fourth quarter of 20x1 will be 30,000 ounces (.20 × 150,000 ounces). This amount also represents the desired units of ending direct materials inventory for the year 20x1. The 24,000 ounces of the first quarter’s beginning direct materials inventory is also the desired units of beginning direct materials inventory for the year 20x1.

In this example, Hi-Flyer Company uses only one direct material. Organizations that purchase a large variety of materials or parts for production may prepare either separate schedules for each material required or one comprehensive direct materials purchases budget.

THE DIRECT LABOR BUDGET The **direct labor budget** is a detailed schedule that identifies the direct labor needs for a future period and the labor costs associated with those needs. The Production Department uses direct labor hours to schedule the number of employees and the hours that each will work, and the accountant uses direct labor costs to estimate the cash payments to direct labor workers. The information in the direct labor budget also helps the Human Resources Department plan for hiring new employees, training current and new employees, or reducing the number of employees.

Exhibit 3

Direct Materials Purchases Budget

Hi-Flyer Company
Direct Materials Purchases Budget
For the Year Ended December 31, 20x1

	Quarter				Year
	1	2	3	4	
Total Production Units (Exhibit 2)	12,000	28,000	13,000	37,500	90,500
× 10 Ounces per Unit	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
Total Production Needs in Ounces	120,000	280,000	130,000	375,000	905,000
Add Desired Ounces of Ending Direct Materials Inventory	<u>56,000</u>	<u>26,000</u>	<u>75,000</u>	<u>30,000</u>	<u>30,000</u>
	176,000	306,000	205,000	405,000	935,000
Less Desired Ounces of Beginning Direct Materials Inventory	<u>24,000</u>	<u>56,000</u>	<u>26,000</u>	<u>75,000</u>	<u>24,000</u>
Total Ounces of Direct Materials to Be Purchased	152,000	250,000	179,000	330,000	911,000
× Cost per Ounce	<u>\$.05</u>	<u>\$.05</u>	<u>\$.05</u>	<u>\$.05</u>	<u>\$.05</u>
Total Cost of Direct Materials Purchases	<u>\$ 7,600</u>	<u>\$12,500</u>	<u>\$ 8,950</u>	<u>\$ 16,500</u>	<u>\$45,550</u>

Note 1: Desired ounces of ending direct materials inventory = 20% of *next* quarter's budgeted production needs in ounces.

Note 2: Desired ounces of beginning direct materials inventory = 20% of *current* quarter's budgeted production needs in ounces.

Note 3: Assume that budgeted production needs in ounces for the first quarter of 20x2 = 150,000 ounces.

Note 4: The desired direct materials inventory balance at December 31, 20x0 = 24,000 ounces × \$.05 per ounce = \$1,200 and at December 31, 20x1 = 30,000 ounces × \$.05 per ounce = \$1,500.

The first step in preparing a direct labor budget is to estimate the total direct labor hours by multiplying the estimated direct labor hours per unit by the anticipated units of production (see Exhibit 2). The second step in preparing such a budget is to calculate the total budgeted direct labor cost by multiplying the estimated total direct labor hours by the estimated direct labor cost per hour. The Human Resources Department provides an estimate of the hourly labor wages for the workers.

$$\begin{array}{rcl} \text{Total Budgeted} & & \\ \text{Direct Labor} & = & \text{Estimated} \times \text{Estimated} \\ \text{Cost} & & \text{Total Direct} \quad \text{Direct Labor} \\ & & \text{Labor Hours} \quad \text{Cost per Hour} \end{array}$$

Exhibit 4 illustrates the direct labor budget for Hi-Flyer Company, using these formulas to estimate the total budgeted direct labor cost. The Production Department needs an estimated .10 direct labor hour to complete one Hi-Flyer. The Human Resources Department estimates a direct labor cost of \$6 per direct labor hour. In this example, Hi-Flyer Company needs only one production department. Organizations that require varying production processes and varying levels of expertise may prepare either separate schedules for each type of labor or one comprehensive direct labor budget.

Hi-Flyer Company
Direct Labor Budget
For the Year Ended December 31, 20x1

	Quarter				Year
	1	2	3	4	
Total Production Units (Exhibit 2)	12,000	28,000	13,000	37,500	90,500
× Direct Labor Hours per Unit	.1	.1	.1	.1	.1
Total Direct Labor Hours	1,200	2,800	1,300	3,750	9,050
× Direct Labor Cost per Hour	\$ 6	\$ 6	\$ 6	\$ 6	\$ 6
Total Direct Labor Cost	<u>\$7,200</u>	<u>\$16,800</u>	<u>\$7,800</u>	<u>\$22,500</u>	<u>\$54,300</u>

EXHIBIT 4**Direct Labor Budget****THE MANUFACTURING OVERHEAD BUDGET**

The **manufacturing overhead budget** is a detailed schedule of anticipated manufacturing costs, other than direct materials and direct labor costs, that must be incurred to meet the production expectations of a future period. The manufacturing overhead budget has two purposes: (1) to integrate the overhead cost budgets developed by the managers of production and production-related service departments and (2) to group information for the calculation of manufacturing overhead rates for the forthcoming accounting period.

EXHIBIT 5**Manufacturing Overhead Budget**

Hi-Flyer Company
Manufacturing Overhead Budget
For the Year Ended December 31, 20x1

	Quarter				Year
	1	2	3	4	
Variable Overhead Costs					
Factory Supplies	\$ 2,160	\$ 5,040	\$ 2,340	\$ 6,750	\$ 16,290
Employee Benefits	2,880	6,720	3,120	9,000	21,720
Inspection	1,080	2,520	1,170	3,375	8,145
Maintenance and Repair	1,920	4,480	2,080	6,000	14,480
Utilities	3,600	8,400	3,900	11,250	27,150
Total Variable Overhead	<u>\$11,640</u>	<u>\$27,160</u>	<u>\$12,610</u>	<u>\$36,375</u>	<u>\$ 87,785</u>
Fixed Overhead Costs					
Depreciation, Machinery	\$ 2,810	\$ 2,810	\$ 2,810	\$ 2,810	\$ 11,240
Depreciation, Building	3,225	3,225	3,225	3,225	12,900
Supervision	9,000	9,000	9,000	9,000	36,000
Maintenance and Repair	2,150	2,150	2,150	2,150	8,600
Other Overhead Expenses	3,175	3,175	3,175	3,175	12,700
Total Fixed Overhead	<u>\$20,360</u>	<u>\$20,360</u>	<u>\$20,360</u>	<u>\$20,360</u>	<u>\$81,440</u>
Total Manufacturing Overhead Costs	<u>\$32,000</u>	<u>\$47,520</u>	<u>\$32,970</u>	<u>\$56,735</u>	<u>\$169,225</u>

The presentation of information in the manufacturing overhead budget is flexible. Grouping information by activities is useful for organizations using activity-based costing. This approach helps the accountant to more easily determine the application rates for each cost pool.

The Hi-Flyer Company prefers to group information into variable and fixed costs for cost-volume-profit analysis during the executing stage of the management cycle (see Exhibit 5). The manufacturing overhead rate for Hi-Flyer Company is the estimated total manufacturing costs divided by the estimated total direct labor hours. The predetermined manufacturing overhead rate for 20x1 is \$18.70 per direct labor hour ($\$169,225 \div 9,050$ direct labor hours), or \$1.87 per unit ($\18.70 per direct labor hour $\times .10$ direct labor hour per unit). The variable portion of the manufacturing overhead rate is \$9.70 per direct labor hour ($\$87,785 \div 9,050$ direct labor hours), which includes factory supplies, \$1.80; employee benefits, \$2.40; inspection, \$.90; maintenance and repair, \$1.60; and utilities, \$3.00.

THE SELLING AND ADMINISTRATIVE EXPENSE BUDGET A **selling and administrative expense budget** is a detailed plan of operating expenses, other than those of the production function, needed to support the sales and overall operations of the organization for a future period. The accountant uses the estimated selling and administrative expense budget to estimate cash payments for products or services used in nonproduction-related activities. Exhibit 6 illustrates the selling and

Exhibit 6
Selling and Administrative
Expense Budget

Hi-Flyer Company
Selling and Administrative Expense Budget
For the Year Ended December 31, 20x1

	Quarter				Year
	1	2	3	4	
Variable Selling and Administrative Expenses					
Delivery Expenses	\$ 800	\$ 2,400	\$ 800	\$ 3,200	\$ 7,200
Sales Commissions	1,000	3,000	1,000	4,000	9,000
Accounting	700	2,100	700	2,800	6,300
Other Administrative Expenses	400	1,200	400	1,600	3,600
Total Variable Selling and Administrative Expenses	<u>\$ 2,900</u>	<u>\$ 8,700</u>	<u>\$ 2,900</u>	<u>\$11,600</u>	<u>\$ 26,100</u>
Fixed Selling and Administrative Expenses					
Sales Salaries	\$ 4,500	\$ 4,500	\$ 4,500	\$ 4,500	\$ 18,000
Executive Salaries	12,750	12,750	12,750	12,750	51,000
Depreciation, Office Equipment	925	925	925	925	3,700
Taxes and Insurance	1,700	1,700	1,700	1,700	6,800
Total Fixed Selling and Administrative Expenses	<u>\$19,875</u>	<u>\$19,875</u>	<u>\$19,875</u>	<u>\$19,875</u>	<u>\$ 79,500</u>
Total Selling and Administrative Expenses	<u>\$22,775</u>	<u>\$28,575</u>	<u>\$22,775</u>	<u>\$31,475</u>	<u>\$105,600</u>

Exhibit 7
Cost of Goods Manufactured Budget

Hi-Flyer Company Cost of Goods Manufactured Budget For the Year Ended December 31, 20x1		Sources of Data
Direct Materials Used		
Direct Materials Inventory, December 31, 20x0	\$ 1,200	Exhibit 3, Note 4
Purchases for 20x1	<u>45,550</u>	Exhibit 3
Cost of Direct Materials Available for Use	\$46,750	
Less Direct Materials Inventory, December 31, 20x1	<u>1,500</u>	Exhibit 3, Note 4
Cost of Direct Materials Used	\$ 45,250	
Direct Labor Costs	54,300	Exhibit 4
Manufacturing Overhead Costs	<u>169,225</u>	Exhibit 5
Total Manufacturing Costs	\$268,775	
Work in Process Inventory, December 31, 20x0*	—	
Less Work in Process Inventory, December 31, 20x1*	<u>—</u>	
Cost of Goods Manufactured	<u><u>\$268,775</u></u>	

*It is a company policy to have no units in process at the beginning or end of the year.

administrative expense budget for Hi-Flyer Company, which groups expenses into variable and fixed components for purposes of cost behavior analysis, cost-volume-profit analysis, and profit planning.

THE COST OF GOODS MANUFACTURED BUDGET The **cost of goods manufactured budget** is a detailed schedule that summarizes the costs of production for a future period. The sources of budget information for the total manufacturing costs are the budgets for direct materials, direct labor, and manufacturing overhead (Exhibits 3, 4, and 5). Most manufacturing organizations anticipate some work in process at the beginning or end of the future period. However, we assume that the Hi-Flyer Company has a policy of no work in process on December 31 of any year. Exhibit 7 summarizes the costs of production for Hi-Flyer Company. The budgeted, or standard, product unit cost for one Hi-Flyer is rounded to \$2.97 (\$268,775 ÷ 90,500 units).

The Budgeted Income Statement

After the operating budgets have been prepared, the budget director or the controller can prepare the budgeted income statement for the period. A **budgeted income statement** projects an organization's net income based on the estimated revenues and expenses for a future period. Information about projected sales and costs comes from several operating budgets. Hi-Flyer Company's budgeted income statement for 20x1 is shown in Exhibit 8. Note that the right side of both Exhibits 7 and 8 identifies the sources of key elements, which makes it possible to trace the statement's development. At this point, you can review the overall preparation of the operating budgets by comparing the preparation flow in Figure 2 to the schedules in Exhibits 1 through 8. You will notice that the budgeted cost of goods sold was included in the budgeted income statement instead of being shown as a separate schedule.

Exhibit 8
Budgeted Income Statement

Hi-Flyer Company Budgeted Income Statement For the Year Ended December 31, 20x1			Sources of Data
Sales		\$450,000	Exhibit 1
Cost of Goods Sold			
Finished Goods Inventory, December 31, 20x0*	\$ 2,970		Exhibit 7
Cost of Goods Manufactured	<u>268,775</u>		
Total Cost of Goods Available for Sale	\$271,745		
Less Finished Goods Inventory, December 31, 20x1*	<u>4,455</u>		
Cost of Goods Sold		<u>267,290</u>	
Gross Margin		\$182,710	Exhibit 6
Selling and Administrative Expenses		<u>105,600</u>	
Income from Operations		\$ 77,110	
Interest Expense (8% × \$70,000)		<u>5,600</u>	
Income Before Income Taxes		\$ 71,510	
Income Taxes Expense (30%)		<u>21,453</u>	
Net Income		<u>\$ 50,057</u>	

*Finished goods inventory balances assume that product unit costs were the same in 20x0 and 20x1.

December 31, 20x0	December 31, 20x1	
1,000 units	1,500 units	(Exhibit 2)
× \$ 2.97	× \$ 2.97	(Exhibit 7)
<u>\$2,970</u>	<u>\$4,455</u>	

The Capital Expenditures Budget

A **capital expenditures budget** is a detailed plan outlining the amount and timing of anticipated capital expenditures for a future period. Buying equipment, building a new store outlet, purchasing and installing a materials handling system, and acquiring another business are examples of capital expenditure decisions that require a capital expenditures budget. Budgeting for capital expenditures decisions is discussed in another chapter. In our illustration, Hi-Flyer Company plans to purchase a new extrusion machine for \$30,000. The company will pay \$15,000 in the first quarter of 20x1, when the order is placed, and \$15,000 in the second quarter of 20x1, when the equipment is received.

Cash Budgeting

OBJECTIVE

4 Prepare a cash budget

A **cash budget** is a projection of the cash receipts and cash payments for a future period. It summarizes the cash flow forecasts of planned transactions in all phases of a master budget. This information helps managers plan for short-term loans when the cash balance is low and for short-term investments when the cash balance is high. The elements of a cash budget can relate to operating, investing, or financing activities, as shown by the examples in Table 2.

Table 2. Elements of a Cash Budget

Activities	Cash Receipts From*	Cash Payments For*
Operating	Cash sales Cash collections on credit sales Interest income from investments Cash dividends from investments	Purchases of direct materials Purchases of indirect materials Direct labor Manufacturing overhead expenses Selling expenses Administrative expenses Interest expense
Investing	Sale of investments Sale of long-term assets	Purchase of investments Purchase of long-term assets
Financing	Loan proceeds Proceeds from issue of stock Proceeds from issue of bonds	Loan repayment Cash dividends to stockholders

*Classifications correspond to the statement of cash flows.

The cash budget excludes some planned noncash transactions, such as depreciation expense, amortization expense, issuance and receipt of stock dividends, uncollectible accounts expense, and gains and losses on sales of assets. Some organizations also exclude deferred taxes and accrued interest.

Information about cash receipts comes from several sources, including the sales budget, cash collection records and trends, the budgeted income statement, the cash budgets from previous periods, and financial records of notes, stocks, and bonds. Information about cash payments comes from operating budgets, capital expenditures budgets, the previous year's financial statements, loan records, and the budgeted income statement. The accountant will convert credit sales to cash inflows and materials purchases on credit to cash outflows and disclose those conversions on supporting schedules for the cash budget.

PREPARING A CASH BUDGET In our illustration, the cash budget summarizes cash inflows and cash outflows for the four quarters of 20x1 and for the entire year. A useful format for the preparation of a cash budget is:

Estimated		Total		Total		Estimated
Ending	=	Estimated	-	Estimated	+	Beginning
Cash Balance		Cash Receipts		Cash Payments		Cash Balance

Many organizations also need to prepare supporting schedules for cash inflows or cash outflows that fluctuate over time. For example, the Hi-Flyer Company expects to receive cash from cash sales and credit sales in 20x1. The projected collection of that cash is shown in Exhibit 9, the schedule of expected cash collections from customers. Cash sales will represent 20 percent of the current quarter's sales, and the remaining 80 percent of sales will be credit sales. Experience has shown that 60 percent of all credit sales are collected in the quarter of sale, 30 percent are collected in the quarter following sale, and 10 percent are collected in the second quarter following sale.

Exhibit 9 shows that in the first quarter of 20x1, Hi-Flyer Company will collect \$38,000 of the \$48,000 balance of accounts receivable at December 31, 20x0. The company will collect the remaining portion of the \$48,000 balance (\$10,000) in the second quarter of 20x1. The estimated ending balance of Accounts Receivable

Exhibit 9**Schedule of Expected Cash Collections from Customers**

Hi-Flyer Company
Schedule of Expected Cash Collections from Customers
For the Year Ended December 31, 20x1

	Quarter				Year
	1	2	3	4	
Accounts Receivable, Dec. 31, 20x0	\$38,000	\$ 10,000	—	—	\$ 48,000
Cash Sales	10,000	30,000	\$10,000	\$ 40,000	90,000
Collections of Credit Sales					
First Quarter (\$40,000)	24,000	12,000	4,000		40,000
Second Quarter (\$120,000)		72,000	36,000	12,000	120,000
Third Quarter (\$40,000)			24,000	12,000	36,000
Fourth Quarter (\$160,000)				96,000	96,000
Total Cash to Be Collected from Customers	<u>\$72,000</u>	<u>\$124,000</u>	<u>\$74,000</u>	<u>\$160,000</u>	<u>\$430,000</u>

Note 1: 20% of sales are cash sales, 80% are credit sales. Credit sales are collected as follows: 60% of all credit sales are collected in the quarter of sale, 30% are collected in the quarter following sale, and 10% are collected in the second quarter following sale.

Note 2: The Accounts Receivable balance at December 31, 20x0, is \$48,000, which is \$8,000 from 20x0 third quarter sales $[(\$100,000 \times .80) \times .10]$ and \$40,000 from 20x0 fourth quarter sales $[(\$125,000 \times .80) \times .40]$.

Note 3: The Accounts Receivable balance at December 31, 20x1, is \$68,000, which is \$4,000 from the third quarter's sales $[(\$50,000 \times .80) \times .10]$ and \$64,000 from the fourth quarter's sales $[(\$200,000 \times .80) \times .40]$.

at December 31, 20x1, is \$68,000, which is \$4,000 from the third quarter's credit sales $[(\$50,000 \times .80) \times .10]$ plus \$64,000 from the fourth quarter's sales $[(\$200,000 \times .80) \times .40]$. The expected cash collections from this exhibit flow to the total cash receipts section of the cash budget.

Our illustration continues with the preparation of a schedule of expected cash payments for direct materials. To simplify the illustration, Hi-Flyer Company will pay 50 percent of the invoices it receives in the quarter of purchase and the remaining 50 percent in the following quarter. The estimated ending balance of Accounts Payable at December 31, 20x1, is \$8,250 (50 percent of the fourth-quarter direct materials purchases of \$16,500). Exhibit 10 shows the schedule for 20x1, which supports the first line of the cash payments section of the cash budget.

The cash budget in Exhibit 11 lists the cash receipts and cash payments, as well as the cash increase or decrease for the period. The cash increase or decrease plus the period's beginning cash balance equals the ending cash balance for the period. In the example in Exhibit 11, you can see that the beginning cash balance for the first quarter was \$20,000. This amount also represents the beginning cash balance for the year 20x1. In addition, notice that each quarter's budgeted ending cash balance becomes the next quarter's beginning cash balance. To assist you in following the development of this budget, the sources for all information are listed on the right side of the exhibit.

Many organizations maintain a minimum cash balance to cover unusual expenditures. If the ending cash balance on the cash budget falls below the minimum required cash level, short-term borrowing may be necessary during the year to cover planned cash payments. If the ending cash balance is significantly larger than

Exhibit 10**Schedule of Expected Cash Payments
for Direct Materials**

Hi-Flyer Company
Schedule of Expected Cash Payments for Direct Materials
For the Year Ended December 31, 20x1

	Quarter				Year
	1	2	3	4	
Accounts Payable, Dec. 31, 20x0	\$4,200	—	—	—	\$ 4,200
First Quarter (\$7,600)	3,800	\$ 3,800			7,600
Second Quarter (\$12,500)		6,250	\$ 6,250		12,500
Third Quarter (\$8,950)			4,475	\$ 4,475	8,950
Fourth Quarter (\$16,500)				8,250	8,250
Total Cash Payments for Direct Materials	<u>\$8,000</u>	<u>\$10,050</u>	<u>\$10,725</u>	<u>\$12,725</u>	<u>\$41,500</u>

Note 1: 50% of the direct materials purchases are paid in the quarter of purchase and 50% are paid in the following quarter.

Note 2: The Accounts Payable balance at December 31, 20x0, is \$4,200, or 50% of the 20x0 fourth-quarter direct materials purchases of \$8,400.

Note 3: The Accounts Payable balance at December 31, 20x1 is \$8,250, or 50% of the fourth-quarter direct materials purchases of \$16,500.

the organization needs, the excess cash may be invested in short-term securities to generate additional income.

Let's examine the 20x1 cash budget for the Hi-Flyer Company presented in Exhibit 11. If we assume that management wants a minimum of \$10,000 cash available at the end of each quarter, the balance at the end of the first quarter indicates a problem. Hi-Flyer's management has several options for managing the low cash balance for the first quarter. The organization can borrow cash to cover the first quarter's cash needs, delay purchase of the equipment until the second quarter, or reduce some of the operating expenses. On the other hand, the balance at the end of the fourth quarter may be excessively high, which could lead management to invest a portion of the idle cash in short-term securities.

FOCUS ON BUSINESS PRACTICE



Hexacomb Corporation and other companies use budgets in their "open-book management" system to motivate employees to achieve company goals. Hexacomb's "beat the budget" bonus system offers employees bonuses based on their plant's performance. Management consults with employees at each

of the company's seven plants to develop an annual budget. Scorecards, which include an income statement, a balance sheet, and relevant nonfinancial measures, are distributed throughout the plants to track actual performance compared to the budget. Managers and employees review the financial information each month and adjust operating activities, if necessary. If profits exceed the budgeted amount for the seven plants, half of the excess amount is placed into a bonus pool. Employees collect the bonus if their plant beats its budget.⁴

Exhibit 11

Cash Budget

Hi-Flyer Company
Cash Budget
For the Year Ended December 31, 20x1

	Quarter				Year	Sources of Data
	1	2	3	4		
Cash Receipts						
Expected Cash Collections from Customers	\$ 72,000	\$124,000	\$74,000	\$160,000	\$430,000	Exhibit 9
Total Cash Receipts	<u>\$ 72,000</u>	<u>\$124,000</u>	<u>\$74,000</u>	<u>\$160,000</u>	<u>\$430,000</u>	
Cash Payments						
Direct Materials	\$ 8,000	\$ 10,050	\$10,725	\$ 12,725	\$ 41,500	Exhibit 10
Direct Labor	7,200	16,800	7,800	22,500	54,300	Exhibit 4
Factory Supplies	2,160	5,040	2,340	6,750	16,290	Exhibit 5
Employee Benefits	2,880	6,720	3,120	9,000	21,720	
Inspection	1,080	2,520	1,170	3,375	8,145	
Maintenance and Repair	1,920	4,480	2,080	6,000	14,480	
Utilities	3,600	8,400	3,900	11,250	27,150	
Supervision	9,000	9,000	9,000	9,000	36,000	Exhibit 6
Maintenance and Repair	2,150	2,150	2,150	2,150	8,600	
Other Overhead Expenses	3,175	3,175	3,175	3,175	12,700	
Delivery Expenses	800	2,400	800	3,200	7,200	
Sales Commissions	1,000	3,000	1,000	4,000	9,000	
Accounting	700	2,100	700	2,800	6,300	Exhibit 8
Other Administrative Expenses	400	1,200	400	1,600	3,600	
Sales Salaries	4,500	4,500	4,500	4,500	18,000	
Executive Salaries	12,750	12,750	12,750	12,750	51,000	
Taxes and Insurance	1,700	1,700	1,700	1,700	6,800	
Capital Expenditures	15,000	15,000	—	—	30,000	Note
Interest Expense	1,400	1,400	1,400	1,400	5,600	Exhibit 8
Income Taxes	5,363	5,363	5,363	5,364	21,453	
Total Cash Payments	<u>\$ 84,778</u>	<u>\$117,748</u>	<u>\$74,073</u>	<u>\$123,239</u>	<u>\$399,838</u>	
Cash Increase (Decrease)	<u>\$(12,778)</u>	<u>\$ 6,252</u>	<u>\$ (73)</u>	<u>\$ 36,761</u>	<u>\$ 30,162</u>	
Beginning Cash Balance	<u>2,722</u>	<u>7,222</u>	<u>13,474</u>	<u>13,401</u>	<u>20,000</u>	
Ending Cash Balance	<u><u>\$ 7,222</u></u>	<u><u>\$ 13,474</u></u>	<u><u>\$13,401</u></u>	<u><u>\$ 50,162</u></u>	<u><u>\$ 50,162</u></u>	

Note: A new extrusion machine costing \$30,000 will be paid for in two quarterly installments of \$15,000 each in the first and second quarters of 20x1.

The Budgeted Balance Sheet

OBJECTIVE

5 Prepare a budgeted balance sheet

The final step in developing the master budget is to prepare a budgeted balance sheet. A **budgeted balance sheet** projects the financial position of an organization for a future period. As shown in Figure 2, all budgeted information is used in this process. The budgeted balance sheet at December 31, 20x1, for the Hi-Flyer Company is illustrated in Exhibit 12. To assist you in following the development of

Exhibit 12

Budgeted Balance Sheet

Hi-Flyer Company
Budgeted Balance Sheet
For the Year Ended December 31, 20x1

Sources
of Data

Assets			
Current Assets			
Cash	\$ 50,162		Exhibit 11
Accounts Receivable	68,000		Exhibit 9, Note 3
Direct Materials Inventory	1,500		Exhibit 7
Work in Process Inventory	—		Exhibit 7, Note
Finished Goods Inventory	4,455		Exhibit 8, Note
Total Current Assets		\$124,117	
Property, Plant, and Equipment			
Land	\$ 50,000		
Plant and Equipment	\$200,000		Note 1
Less Accumulated Depreciation	45,000	155,000	Note 2
Total Property, Plant, and Equipment		205,000	
Total Assets		\$329,117	
Liabilities			
Current Liabilities			
Accounts Payable		\$ 8,250	Exhibit 10, Note 3
Total Current Liabilities		\$ 8,250	
Long-Term Liabilities			
Notes Payable		70,000	Note 3
Total Liabilities		\$ 78,250	
Stockholders' Equity			
Contributed Capital			
Common Stock	\$150,000		Note 4
Retained Earnings	100,867		Note 5
Total Stockholders' Equity		250,867	
Total Liabilities and Stockholders' Equity		\$329,117	

Note 1: The Plant and Equipment balance includes the \$30,000 equipment purchase.

Note 2: The Accumulated Depreciation balance includes the 20x1 depreciation expense totaling \$27,840 for Machinery, Building, and Equipment (\$11,240, \$12,900, and \$3,700, respectively).

Note 3: Management plans no change in the Notes Payable balance.

Note 4: Management plans no change in the Common Stock balance.

Note 5: The Retained Earnings balance at December 31 equals the beginning Retained Earnings balance plus the 20x1 projected net income (\$50,810 and \$50,057, respectively).

this statement, the sources of all information are listed on the right side of the exhibit and notes are included at the bottom.

Budget Implementation

When the master budget is completed, management must decide whether to accept the proposed master budget and the planned operating results it presents, or to change the plans and revise the budget. Once the master budget has been accepted, it must be implemented.

Budget implementation is the responsibility of the budget director. Two elements discussed earlier—communication and support—determine the success of this process. Proper communication of expectations and targets to all key people in the organization is essential. All involved employees must know what is expected of them and must receive directions on how to achieve their goals. Equally important, top management must support the budgeting process and encourage implementation of the budget. The process will succeed only if middle- and lower-level managers can see that top management is truly interested in the outcome and is willing to reward people for meeting the budget goals.

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

1. Define *budgeting* and explain its role in the management cycle.

Budgeting is the process of identifying, gathering, summarizing, and communicating financial and nonfinancial information about future activities in an organization. Budgeting helps managers (1) relate the organization's long-term goals to short-term goals and activities and distribute resources during the planning stage; (2) communicate expectations, motivate others, and coordinate activities during the executing stage; (3) evaluate performance and solve problems during the reviewing stage; and (4) communicate budget information, report the organization's financing, investing, and operating activities, and provide continuous feedback during the reporting stage of the management cycle.

2. Describe the master budget process for different types of organizations, and list the guidelines for preparing budgets.

A master budget is a set of budgets that consolidates an organization's financial information into budgeted financial statements for a future period of time. A master budget includes a budgeted income statement supported by a set of operating budgets, a budgeted balance sheet, and a cash budget. The operating budgets (1) for a manufacturing organization include budgets for sales, production, direct materials purchases, direct labor, manufacturing overhead, and selling and administrative expenses; (2) for a retail organization include budgets for sales, merchandise purchases, and selling and administrative expenses; and (3) for a service organization include budgets for service revenue, labor, services overhead, and selling and administrative expenses. Preliminary planning involves knowing the purpose of the budget, the user group and their information needs, the sources of budget information, and the budget components.

- 3. Prepare a budgeted income statement and supporting operating budgets.** The initial step in preparing a budgeted income statement is to prepare a sales budget. After preparing the sales budget, managers or accountants at a manufacturing organization prepare a production budget followed by budgets for direct materials purchases, direct labor, manufacturing overhead, selling and administrative expenses, cost of goods manufactured, and cost of goods sold. The information from those operating budgets supports the information on the budgeted income statement.
- 4. Prepare a cash budget.** A cash budget is a projection of the cash receipts and cash payments for a future period. A cash budget summarizes the cash flows expected to result from planned transactions for a future period. A cash budget identifies the organization's projected ending cash balance and shows a manager when short-term borrowing or investing may be appropriate.
The preparation of a cash budget begins with the projection of all expected sources of cash. Next, all expected cash payments are found by analyzing all other operating budgets and the capital expenditures budget within the master budget. The difference between the two totals is the cash increase or decrease anticipated for the period. That total, combined with the period's beginning cash balance, yields the ending cash balance.
- 5. Prepare a budgeted balance sheet.** The final step in the master budget process is to prepare a budgeted balance sheet for the company. All budgeted data are used in this process.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- LO 1 Budget:** A plan of action that forecasts future transactions, activities, and events in financial or nonfinancial terms.
- LO 5 Budgeted balance sheet:** A statement that projects the financial position of an organization at the end of a future period.
- LO 3 Budgeted income statement:** A statement that projects an organization's net income based on the estimated revenues and expenses for a future period.
- LO 1 Budgeting:** The process of identifying, gathering, summarizing, and communicating financial and nonfinancial information about an organization's future activities.
- LO 3 Capital expenditures budget:** A detailed plan outlining the amount and timing of anticipated payments for long-term assets for a future period.
- LO 4 Cash budget:** A projection of the cash receipts and cash payments for a future period.
- LO 3 Cost of goods manufactured budget:** A detailed schedule that summarizes the costs of production for a future period.
- LO 3 Direct labor budget:** A detailed schedule that identifies the quantity of direct labor needs for a future period and the labor costs associated with those needs.
- LO 3 Direct materials purchases budget:** A detailed schedule that identifies the quantity of purchases required for budgeted production and inventory needs and the costs associated with those purchases.
- LO 3 Manufacturing overhead budget:** A detailed schedule of anticipated manufacturing costs, other than direct materials and direct labor costs, that must be incurred to meet the production expectations of a future period.
- LO 2 Master budget:** A set of budgets that consolidates an organization's financial information into budgeted financial statements for a future period of time.

- L0 1 Participative budgeting:** A process in which personnel at all levels of an organization meaningfully and actively take part in the creation of budgets.
- L0 3 Production budget:** A detailed schedule that identifies the products or services that must be produced or provided to meet budgeted sales and inventory needs.
- L0 3 Sales budget:** A detailed plan, expressed in both units and dollars, that identifies expected product (or service) sales for a future period.
- L0 3 Sales forecast:** A projection of sales demand based on an analysis of external and internal factors.
- L0 3 Selling and administrative expense budget:** A detailed plan of operating expenses, other than those of the production function, needed to support the sales and overall operations of the organization for a future period.

REVIEW PROBLEM

Cash Budget Preparation

- L0 4** Pearce Information Processing Company provides word processing services for its clients. Pearce uses state-of-the-art equipment and employs five data entry clerks who each average 160 hours of work a month. The following table sets out information developed by the budget officer.

	Actual—20x0		Forecast—20x1		
	November	December	January	February	March
Client billings (sales)	\$25,000	\$35,000	\$25,000	\$20,000	\$40,000
Selling and administrative expenses	12,000	13,000	12,000	11,000	12,500
Operating supplies purchased	2,500	3,500	2,500	2,500	4,000
Processing overhead	3,200	3,500	3,000	2,500	3,500

The company has a bank loan of \$12,000 at a 12 percent annual interest rate. Interest is paid monthly, and \$2,000 of the principal of the loan is due on February 28, 20x1. No capital expenditures are anticipated for the first quarter of the coming year. Income taxes of \$4,550 for calendar year 20x0 are due and payable on March 15, 20x1. The company's five employees earn \$8.50 an hour, and all payroll-related labor benefit costs are included in processing overhead. For the items included in the table, assume the following conditions.

- Client billings 60% are cash sales collected during the month of sale
 30% are collected in the first month following the sale
 10% are collected in the second month following the sale
- Operating supplies Paid for in the month purchased
- Selling and administrative
 expenses and processing
 overhead Paid in the month following the cost's incurrence

The cash balance on December 31, 20x0, is expected to be \$13,840.

REQUIRED

Prepare a monthly cash budget for Pearce Information Processing Company for the three-month period ended March 31, 20x1.

ANSWER TO REVIEW PROBLEM

A monthly cash budget for Pearce Information Processing Company for the three-month period ended March 31, 20x1 appears on the next page, together with details supporting the individual computations.

Pearce Information Processing Company
Monthly Cash Budget
For the Three-Month Period Ended March 31, 20x1

	January	February	March	Totals
Cash Receipts				
Client billings	\$28,000	\$23,000	\$32,500	\$83,500
Cash Payments				
Operating Supplies	\$ 2,500	\$ 2,500	\$ 4,000	\$ 9,000
Direct Labor	6,800	6,800	6,800	20,400
Selling and Administrative Expenses	13,000	12,000	11,000	36,000
Processing Overhead	3,500	3,000	2,500	9,000
Interest Expense	120	120	100	340
Loan Payment	—	2,000	—	2,000
Income Tax Payment	—	—	4,550	4,550
Total Cash Payments	\$25,920	\$26,420	\$28,950	\$81,290
Cash Increase (Decrease)	\$ 2,080	(\$ 3,420)	\$ 3,550	\$ 2,210
Beginning Cash Balance	13,840	15,920	12,500	13,840
Ending Cash Balance	<u>\$15,920</u>	<u>\$12,500</u>	<u>\$16,050</u>	<u>\$16,050</u>

The details supporting the individual computations within this cash budget are as follows:

	January	February	March
Client Billings			
November	\$ 2,500	—	—
December	10,500	\$ 3,500	—
January	15,000	7,500	\$ 2,500
February	—	12,000	6,000
March	—	—	24,000
	<u>\$28,000</u>	<u>\$23,000</u>	<u>\$32,500</u>
Operating Supplies			
All paid in the month purchased	\$ 2,500	\$ 2,500	\$ 4,000
Direct Labor			
5 employees × 160 hours a month × \$8.50 an hour	6,800	6,800	6,800
Selling and Administrative Expenses			
Paid in the month following incurrence	13,000	12,000	11,000
Processing Overhead			
Paid in the month following incurrence	3,500	3,000	2,500
Interest Expense			
January and February = 1% of \$12,000	120	120	
March = 1% of \$10,000			100
Loan Payment	—	2,000	—
Income Tax Payment	—	—	4,550

The ending cash balances of \$15,920, \$12,500, and \$16,050 for January, February, and March 20x1, respectively, appear to be comfortable but not too large for Pearce Information Processing company.

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. Define *budgeting*.
2. What is a budget? What type of information can be included in a budget?
3. List three ways in which budgets can be used in an organization.
4. Distinguish between long-term plans and yearly operating plans.
5. What factors should influence the development of long-term goals?
6. What is the purpose of the following budgeting principle? "Restate the long-term plans in terms of short-term plans for products or services and a detailed profit plan."
7. Explain how budgets are developed once management has set short-term goals.
8. Give examples of ways in which budgeting can help managers during the stages of the management cycle.
9. What is a master budget? What is its purpose?
10. In what ways are master budgets similar for manufacturing, retail, and service organizations?
11. Explain the differences between the master budget for a retail organization and the master budget for a service organization.
12. List the guidelines for the preparation of a budget.
13. What is a sales forecast? What are some factors that influence the estimation of future unit sales?
14. What are the three steps in preparing a direct materials purchases budget?
15. What are the two steps in preparing a direct labor budget?
16. In the selling and administrative expense budget, why is it useful to distinguish between variable and fixed expenses?
17. How is the cash budget related to the master budget? In what fundamental way do the items in a cash budget differ from those in the master budget?
18. What is the final step in the development of the master budget?
19. Who is responsible for accepting the budget, and who is responsible for implementing it?

SHORT EXERCISES

LO 1 Budgeting and the Management Cycle

- SE 1.** State whether each of the following management activities requiring the use of budget information is part of the planning stage (P), the executing stage (E), the reviewing stage (REV), or the reporting stage (REP) of the management cycle.

1. Coordinate the purchasing, production, selling, and shipping activities.
2. Select performance measures to monitor the timeliness of the shipping activities.
3. Calculate variances between the planned and the actual direct materials used in production last month.
4. Develop a budget to distribute the organization's resources to the various operating segments.
5. Prepare a report showing the performance of the Production Department for the last three months.

LO 1 Manager's Budget Uses

- SE 2.** Jim Gray is the manager of the shoe department in a local discount department store. During a recent meeting, Gray and his supervisor agreed that Gray's goal for the next year would be to increase the number of pairs of shoes sold by 20 percent. The department sold 8,000 pairs of shoes last year. Two shoe salespersons currently work for Gray. What types of budgets should Gray use to help him achieve his sales goal? What kinds of information should those budgets provide?

LO 1 Budgetary Control

SE 3. Andrea Kral analyzes the results of her tree nursery business by comparing the actual operating results with budgeted figures from the beginning of the year. If the business generates large profits, she often overlooks the differences between actual and budgeted data. But if profits are low, she spends many hours analyzing the differences. If you were Kral, would you approach budgetary control in a similar manner? If not, what changes would you make in her approach?

LO 1 Budgeting and Goals

SE 4. The basic principles of budgeting have just been discussed with the dashboard assembly team at the Rockford Automobile Company. The team is participating in the company's budgeting process for the first time. One team member asked the controller to explain how the long-term goals relate to the short-term plan. How should the controller respond?

LO 2 Master Budget Components

SE 5. The master budget is a compilation of many forecasts by department or function for the coming year or operating cycle. What is the most important forecast made in relation to the master budget? List the reasons for your answer. Which budgets must be prepared before you can develop a direct materials purchases budget?

LO 3 Operating Budget Preparation

SE 6. Lockwood Company expects to sell 50,000 units of its product in the coming year. Each unit sells for \$45. Sales brochures and supplies are expected to cost \$7,000 for the year. Three sales representatives cover the southeast region. Each individual's base salary is \$20,000, and each earns a sales commission of 5 percent of the selling price of the units he or she sells. The sales representatives supply their own transportation; they are reimbursed for travel at a rate of \$.40 per mile. Based on the current year's mileage, the sales representatives are expected to drive a total of 75,000 miles next year. From the information provided, calculate the budgeted selling expenses for the coming year.

LO 3 Budgeted Gross Margin

SE 7. Operating budgets for the Constantine Company revealed the following information: net sales, \$450,000; beginning materials inventory, \$23,000; materials purchased, \$185,000; beginning work in process inventory, \$64,700; beginning finished goods inventory, \$21,600; direct labor costs, \$34,000; manufacturing overhead applied, \$67,000; ending work in process inventory, \$61,200; ending materials inventory, \$18,700; and ending finished goods inventory, \$16,300. Compute the company's budgeted gross margin.

LO 4 Estimating Cash Collections

SE 8. BK Insurance Co. specializes in term life insurance contracts. Cash collection experience shows that 20 percent of billed premiums are collected in the month before they are due, 60 percent are paid in the month they are due, and 16 percent are paid in the month following their due date. Four percent of the billed premiums are paid late (in the second month following their due date) and include a 10 percent penalty payment. Total billing notices were January, \$58,000; February, \$62,000; March, \$66,000; April, \$65,000; May, \$60,000; and June, \$62,000. How much cash does the company expect to collect in May?

LO 4 Cash Budget

SE 9. The following direct materials purchases projections are for the Martinson Corp. The company pays for 60 percent of the purchases on account in the month of purchase and 40 percent in the month following the purchase. Prepare a schedule of expected cash payments for direct materials for the first quarter of 20x1.

	Purchases on Account	Cash Purchases
December 20x0	\$40,000	\$20,000
January 20x1	60,000	30,000
February 20x1	50,000	25,000
March 20x1	70,000	35,000

LO 5 Budgeted Balance Sheet

SE 10. Shadow Corporation's budgeted data showed total projected assets for the coming year of \$4,650,000. Total liabilities were expected to be \$1,900,000. Common stock and retained earnings make up the entire stockholders' equity section of the balance sheet. Common stock remains at its beginning balance of \$1,500,000. The projected net income for the year is \$349,600. No cash dividends were paid. What was the balance of retained earnings at the beginning of the budget period?

EXERCISES**LO 1 Budgeting and the Management Cycle**

- E 1.** Viola Wang manages a golf and tennis resort. Indicate whether each of the following management activities requiring the use of budget information is part of the planning stage (P), the executing stage (E), the reviewing stage (REV), or the reporting stage (REP) of the management cycle.
1. Wang develops a budget to distribute limited resources to the Pro Shop, facilities maintenance, golf and tennis operations, hotel operations, and restaurant operations.
 2. Wang challenges the employees to increase the volume of customers eating in the restaurant by 10 percent as set forth in the restaurant's budget.
 3. Wang selects the number of golf lessons given each month as a measure of performance for the golf course operations.
 4. After three months of operations, the resort's accountant prepares a performance report for the restaurant.
 5. Wang analyzes the restaurant's performance report and finds that sales volume is 25 percent lower than planned.
 6. Wang meets with restaurant managers and employees to discuss operations and surveys of resort guests for one month. Based on her findings, Wang expands the number of food items offered on the menu, increases advertising for the restaurant, and replaces the cook.
 7. Ed Dorn, the manager of golf operations, uses the budgeted number of golf lessons to motivate the golf pros to provide more lessons. However, Dorn notices that the quantity of the golf lessons does not increase.
 8. At the end of the month, Dorn calculates the variance between the actual number of golf lessons given and the budgeted number of golf lessons. He finds that fewer lessons were given than originally planned.
 9. Dorn prepares a variance report and gives it to the golf pros for review.
 10. Dorn selects the number of hours of golf instruction as a new performance measure for the remainder of the year.

LO 1 Budget Objectives

- E 2.** You recently attended a workshop on budgeting and overheard the following comments as you moved to the refreshment table.
1. "Budgets look the same regardless of the size of an organization and the role of the budget process in management."
 2. "Budgets can include financial or nonfinancial data. In our organization, we plan the number of hours to be worked and the number of customer contacts we want our salespeople to make."
 3. "All budgets are complicated. You have to be an expert to prepare one."
 4. "Budgets do not need to be highly accurate or very meaningful. No one stays within a budget in our organization."

Do you agree or disagree with each comment? Explain.

LO 1 Budgeting and Goals

- E 3.** The managers of Prairie Calendars, Inc., recently held a planning meeting to develop goals for the company. The company's success has been influenced by the managers' willingness to set effective long-term and short-term goals. Identify the kind of goals related to the following actions taken by the management team.
1. The management team considered economic and industry forecasts, employee-management relationships, and the structure and role of management in forecasting the next ten-year period.
 2. Decisions were made about next year's sales and profit targets by calendar line and sales territory based on the forecast for the next ten years.

LO 1 Budgeting and Goals

- E 4.** Assume that you work in the Accounting Department of a small wholesale warehousing business. Inspired by a seminar on budgeting that she recently attended, the president wants to develop a budgeting system and has asked you to direct it.
- State the points that you should communicate to the president about the initial steps in the budgeting process. Concentrate on principles related to long-term goals and short-term goals.

LO 2 Components of a Master Budget

E 5. Identify the order in which the following budgets are prepared within the master budget process. Use the letters *a* through *g*, with the first budget to be prepared as *a*.

1. Production budget
2. Direct labor budget
3. Direct materials purchases budget
4. Sales budget
5. Budgeted balance sheet
6. Cash budget
7. Budgeted income statement

LO 3 Sales Budget Preparation

E 6. Quarterly and annual sales for 20x1 for the Buchan Manufacturing Company are shown below. Prepare the 20x2 sales budget for the company. Show both quarterly and annual totals for each product class.

Buchan Manufacturing Company
Actual Sales Revenue
For the Year Ended December 31, 20x1

Product Class	January– March	April– June	July– September	October– December	Annual Totals	Estimated 20x2 Percent Increases by Product Class
Marine Products	\$ 44,500	\$ 45,500	\$ 48,200	\$ 47,900	\$ 186,100	10%
Mountain Products	36,900	32,600	34,100	37,200	140,800	5
River Products	29,800	29,700	29,100	27,500	116,100	30
Hiking Products	38,800	37,600	36,900	39,700	153,000	15
Running Products	47,700	48,200	49,400	49,900	195,200	25
Biking Products	65,400	65,900	66,600	67,300	265,200	20
Totals	<u>\$263,100</u>	<u>\$259,500</u>	<u>\$264,300</u>	<u>\$269,500</u>	<u>\$1,056,400</u>	

LO 3 Production Budget Preparation

E 7. Mort Claver, the controller for the E-Z Door Company, is preparing a production budget for 20x7. The company's policy is to maintain a finished goods inventory equal to one-half of the following month's sales. Use the information provided to complete the following production budget for the first quarter. Budgeted sales for April are 7,000 doors.

	January	February	March
Sales in units	5,000	4,000	6,000
Desired Units of Ending Finished Goods Inventory	<u>2,000</u>	<u>?</u>	<u>?</u>
Desired Total Units	7,000		
Less Desired Units of Beginning finished goods inventory	<u>2,500</u>	<u>?</u>	<u>?</u>
Total Production Units	<u>4,500</u>	<u>?</u>	<u>?</u>

LO 3 Direct Materials Purchases Budget

E 8. The E-Z Door Company manufactures garage door units. The units include hinges, door panels, and other hardware. Prepare a direct materials purchases budget for the first quarter of 20x7 based on budgeted production of 16,000 garage door units. Mort Claver, the controller, has provided the following information:

Hinges	4 sets per door	\$11.00 a set
Door panels	4 panels per door	\$27.00 a panel
Other hardware	1 lock per door	\$31.00 a lock
	1 handle per door	\$22.50 a handle
	2 roller tracks per door	\$16.00 for a set of 2 roller tracks
	8 rollers per door	\$4.00 a roller

Assume that the company has no beginning or ending quantities of direct materials inventory.

LO 3 Direct Labor Budget Preparation

- E 9.** Henlow Metals Company manufactures three products in a single plant with two departments: Cutting and Grinding. The company has estimated costs for products T, M, and B and is currently analyzing direct labor hour requirements for the budget year 20x1. The department data follow.

	Cutting	Grinding
Estimated Hours per Unit		
Product T	1.1	.5
Product M	.6	2.9
Product B	3.2	1.0
Hourly Labor Rate	\$9	\$7

Budgeted unit production in 20x1 is 21,000 of Product T, 36,000 of Product M, and 30,000 of Product B. Prepare a direct labor budget for 20x1 that shows the budgeted direct labor costs for each department and for the company as a whole.

LO 3 Manufacturing Overhead Budget

- E 10.** Sue Reeds is chief financial officer of the London Division of Reeds Corporation, a multinational company with three operating divisions. As part of the budgeting process, Reeds's staff is developing the manufacturing overhead budget for 20x1. The division estimates that 50,000 units will be manufactured during the year. The budgeted cost information follows.

	Variable Rate per Unit	Total Fixed Costs
Indirect Materials	\$1.00	
Indirect Labor	4.00	
Supplies	.40	
Repairs and Maintenance	3.00	\$ 40,000
Electricity	.10	20,000
Factory Supervision		180,000
Insurance		25,000
Property Taxes		35,000
Depreciation, Machinery		82,000
Depreciation, Building		72,000

From the data given, prepare the 20x1 manufacturing overhead budget for the London Division.

LO 4 Cash Budget Preparation—Revenues

- E 11.** Car Bros., Inc., is an automobile maintenance and repair organization with outlets throughout the midwestern United States. Heidi Popovic, the budget director for the home office, is beginning to assemble next quarter's cash budget. Sales are projected as follows:

	On Account	Cash
October 20x1	\$452,000	\$196,800
November 20x1	590,000	214,000
December 20x1	720,500	218,400

Popovic's past collection results for sales on account indicate the following pattern.

Month of sale	40%
1st month following sale	30%
2nd month following sale	28%
Uncollectible	2%

Sales on account during the months of August and September were \$346,000 and \$395,000, respectively.

What are the purposes of preparing a cash budget? Compute the amount of cash to be collected from customers during each month of the final quarter.

PROBLEMS

LO 3 Budget Preparation



- P 1.** The main product of Nakamoto Enterprises, Inc., is a multipurpose hammer that carries a lifetime guarantee. The steps in the manufacturing process have been combined by using modern, automated equipment. A list of cost and production information for the Nakamoto hammer follows.

Direct materials

Anodized steel: 2 kilograms per hammer at \$1.60 per kilogram

Leather strapping for the handle: .5 square meter per hammer at \$4.40 per square meter

(Packing materials are returned to the manufacturer and thus are not included as part of cost of goods sold.)

Direct labor

Forging operation: \$12.50 per labor hour; 6 minutes per hammer

Leather-wrapping operation: \$12.00 per direct labor hour; 12 minutes per hammer

Manufacturing overhead

Forging operation: rate equals 70 percent of department's direct labor dollars

Leather-wrapping operation: rate equals 50 percent of department's direct labor dollars

For the three months ending December 31, 20x1, Nakamoto's management expects to produce 108,000 hammers in October, 104,000 hammers in November, and 100,000 hammers in December.

Assume no beginning or ending balances of direct materials inventory or work in process inventory for the year.

REQUIRED

- For the three-month period ending December 31, 20x1, prepare monthly production cost information for the manufacture of the Nakamoto hammer. Classify the costs as direct materials, direct labor, or manufacturing overhead and show the computation methods used.
- Prepare a cost of goods manufactured budget for the hammer. Show monthly cost data and combined totals for the quarter for each cost category.

LO 3 Comprehensive Budgeted Income Statement



- P 2.** Dov Corazon began manufacturing operations for Dov's Bath Oils in 20x1. His biggest customer is a national retail store chain that sells hair and bath products. Corazon would like an estimate of the company's income from operations for 20x2.

Calculate the company's income from operations by completing the following operating budgets and budgeted income statement for Dov's Bath Oils.

REQUIRED

- Sales Budget

**Dov's Bath Oils
Sales Budget
For the Year Ended December 31, 20x2**

	Quarter				Year
	1	2	3	4	
Sales in Units	4,000	3,000	5,000	5,000	17,000
× Selling Price per Unit	\$ 5	?	?	?	?
Total Sales	<u>\$20,000</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>

2. Production Budget

Dov's Bath Oils Production Budget For the Year Ended December 31, 20x2					
	Quarter				Year
	1	2	3	4	
Sales in Units (Budget 1)	4,000	?	?	?	?
Add Desired Units of Ending Finished Goods Inventory	<u>300</u>	<u>?</u>	<u>?</u>	<u>600</u>	<u>600</u>
Desired Total Units	4,300				
Less Desired Units of Beginning Finished Goods Inventory	<u>400</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>400</u>
Total Production Units	<u>3,900</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>

Note 1: Desired units of ending finished goods inventory = 10% of *next* quarter's budgeted sales.

Note 2: Desired units of beginning finished goods inventory = 10% of *current* quarter's budgeted sales.

3. Direct Materials Purchases Budget

Dov's Bath Oils Direct Materials Purchases Budget For the Year Ended December 31, 20x2					
	Quarter				Year
	1	2	3	4	
Total Production Units (Budget 2)	3,900	3,200	5,000	5,100	17,200
× 3 Ounces per Unit	<u>3</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>
Total Production Needs in Ounces	11,700	?	?	?	?
Add Desired Ounces of Ending Direct Materials Inventory	<u>1,920</u>	<u>?</u>	<u>?</u>	<u>3,600</u>	<u>3,600</u>
	13,620				
Less Desired Ounces of Beginning Direct Materials Inventory	<u>2,340</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>2,340</u>
Total Ounces of Direct Materials to be Purchased	11,280	?	?	?	
× Cost per Ounce	<u>\$.10</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>
Total Cost of Direct Materials Purchases	<u>\$ 1,128</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>

Note 1: Desired ounces of ending direct materials inventory = 20% of *next* quarter's budgeted production needs in ounces.

Note 2: Desired ounces of beginning direct materials inventory = 20% of *current* quarter's budgeted production needs in ounces.

Note 3: Assume that budgeted production needs in ounces for the first quarter of 20x3 = 18,000 ounces.

4. Direct Labor Budget

Dov's Bath Oils Direct Labor Budget For the Year Ended December 31, 20x2					
	Quarter				Year
	1	2	3	4	
Total Production Units (Budget 2)	3,900	?	?	?	?
× Direct Labor Hours per Unit	.1	?	?	?	?
Total Direct Labor Hours	390	?	?	?	?
× Direct Labor Cost per Hour	\$ 7	?	?	?	?
Total Direct Labor Cost	<u>\$2,730</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>

5. Manufacturing Overhead Budget

Dov's Bath Oils Manufacturing Overhead Budget For the Year Ended December 31, 20x2					
	Quarter				Year
	1	2	3	4	
Variable Overhead Costs					
Factory Supplies (\$.05)	\$ 195	?	?	?	?
Employee Benefits (\$.25)	975	?	?	?	?
Inspection (\$.10)	390	?	?	?	?
Maintenance and Repair (\$.15)	585	?	?	?	?
Utilities (\$.05)	195	?	?	?	?
Total Variable Overhead	<u>\$2,340</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>
Fixed Overhead Costs					
Depreciation, Machinery	\$ 500	?	?	?	?
Depreciation, Building	700	?	?	?	?
Supervision	1,800	?	?	?	?
Maintenance and Repair	400	?	?	?	?
Other Overhead Expenses	600	?	?	?	?
Total Fixed Overhead	<u>\$4,000</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>
Total Manufacturing Overhead Costs	<u>\$6,340</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>

6. Selling and Administrative Expense Budget

Dov's Bath Oils
Selling and Administrative Expense Budget
For the Year Ended December 31, 20x2

	Quarter				Year
	1	2	3	4	
Variable Selling and Administrative Expenses					
Delivery Expenses (\$.10)	\$ 400	?	?	?	?
Sales Commissions (\$.15)	600	?	?	?	?
Accounting (\$.05)	200	?	?	?	?
Other Administrative Expenses (\$.20)	800	?	?	?	?
Total Variable Selling and Administrative Expenses	<u>\$2,000</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>
Fixed Selling and Administrative Expenses					
Sales Salaries	\$5,000	?	?	?	?
Depreciation, Office Equipment	900	?	?	?	?
Taxes and Insurance	1,700	?	?	?	?
Total Fixed Selling and Administrative Expenses	<u>\$7,600</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>?</u>
Total Selling and Administrative Expenses	<u><u>\$9,600</u></u>	<u><u>?</u></u>	<u><u>?</u></u>	<u><u>?</u></u>	<u><u>?</u></u>

7. Cost of Goods Manufactured Budget

Dov's Bath Oils
Cost of Goods Manufactured Budget
For the Year Ended December 31, 20x2

Direct Materials Used		
Direct Materials Inventory, December 31, 20x1		
Purchases for 20x2	<u>?</u>	(Budget 3)
Cost of Materials Available for Use		
Less Direct Materials Inventory, December 31, 20x2	<u>?</u>	
Cost of Direct Materials Used		
Direct Labor Costs		(Budget 4)
Manufacturing Overhead Costs	<u>?</u>	(Budget 5)
Total Manufacturing Costs		
Work in Process Inventory, December 31, 20x1*		
Less Work in Process Inventory, December 31, 20x2*	<u>?</u>	
Cost of Goods Manufactured	<u><u>?</u></u>	

*It is a company policy to have no units in process at year end.

8. Budgeted Income Statement

Dov's Bath Oils
Budgeted Income Statement
For the Year Ended December 31, 20x2

Sales		
Cost of Goods Sold		
Finished Goods Inventory, December 31, 20x1		
Cost of Goods Manufactured	?	(Budget 7)
Cost of Goods Available for Sale		
Less Finished Goods Inventory, December 31, 20x2	?	
Cost of Goods Sold		?
Gross Margin		
Selling and Administrative Expenses		?
Income from Operations		?
Income Taxes Expense (30%)		?
Net Income		?

LO 4 Basic Cash Budget

- P 3.** Mary Pinoche is president of Woodhull Nurseries, Inc. This corporation has four locations and has been in business for six years. Each retail outlet offers over 300 varieties of plants and trees. Sam Illy, the controller, has been asked to prepare a cash budget for the Southern Division for the first quarter of 20x2.

Projected data supporting the budget are summarized below. Collection history for the accounts receivable has shown that 30 percent of all credit sales are collected in the month of sale, 60 percent in the month following the sale, and 8 percent in the second month following the sale. Two percent of the credit sales are uncollectible. Purchases are all paid for in the month following the purchase. As of December 31, 20x1, the Southern Division had a cash balance of \$9,600.

Sales (60 percent on credit)		Purchases	
November 20x1	\$160,000	December 20x1	\$ 86,800
December 20x1	200,000	January 20x2	124,700
January 20x2	120,000	February 20x2	99,440
February 20x2	160,000	March 20x2	104,800
March 20x2	140,000		

Salaries and wages are projected to be \$25,200 in January; \$33,200 in February; and \$21,200 in March. Monthly costs are estimated to be: utilities, \$4,220; collection fees, \$1,700; rent, \$5,300; equipment depreciation, \$5,440; supplies, \$2,480; small tools, \$3,140; and miscellaneous, \$1,900.

REQUIRED

1. Prepare a cash budget by month for the Southern Division for the first quarter of 20x2.
2. Should Woodhull Nurseries, Inc., anticipate taking out a loan for the Southern Division during the quarter? How much should be borrowed? When? (Note: Management maintains a \$6,000 minimum cash balance at each location.)

- P 4.** Beyond Video Company, Inc., produces and markets two popular video games, "High Range" and "Star Boundary." The company's closing balance sheet account balances for 20x0 are as follows: Cash, \$18,735; Accounts Receivable, \$19,900; Materials Inventory, \$18,510; Work in Process Inventory, \$24,680; Finished Goods Inventory, \$21,940; Prepaid Expenses, \$3,420; Plant and Equipment, \$262,800; Accumulated Depreciation, Plant and Equipment, \$55,845; Other Assets, \$9,480; Accounts Payable, \$52,640; Mortgage Payable, \$70,000; Common Stock, \$90,000; and Retained Earnings, \$110,980.

LO 3 Budgeted Financial
LO 5 Statements


Operating budgets for the first quarter of 20x1 revealed the following: direct materials purchases, \$58,100; direct materials usage, \$62,400; direct labor expense, \$42,880; manufacturing overhead, \$51,910; selling expenses, \$35,820; general and administrative expenses, \$60,240; capital expenditures, \$0; ending cash balances by month: January, \$34,610; February, \$60,190; March, \$54,802; cost of goods manufactured, \$163,990; and cost of goods sold, \$165,440.

Sales per month are projected to be \$125,200 for January, \$105,100 for February, and \$112,600 for March. Accounts receivable will double during the quarter, and accounts payable will decrease by 20 percent. Mortgage payments for the quarter will total \$6,000, of which \$2,000 is interest expense. Prepaid expenses are expected to go up by \$20,000, and other assets are projected to increase 50 percent over the budget period. Depreciation for plant and equipment (already included in the manufacturing overhead budget) averages 5 percent of total Plant and Equipment per year. Federal income taxes (34 percent of profits) are payable in April. No dividends were paid.

REQUIRED

1. Prepare a budgeted income statement for the quarter ending March 31, 20x1.
2. Prepare a budgeted balance sheet as of March 31, 20x1.

LO 4 Cash Budget Preparation: Comprehensive



- P 5.** Thomas's Wellness Centers, Inc., operates three fully equipped personal health facilities in Scottsdale, Arizona. In addition to the health facilities, the corporation maintains a complete medical center specializing in preventive medicine. Emphasis is placed on regular workouts and medical examinations. The following projections have been made for 20x4.

Cash Receipts: First Quarter, 20x4

Membership dues:

Memberships: December 20x3, 870; January 20x4, 880; February, 910; and March, 1,030

Dues: \$90 per month, payable on the 10th (80 percent collected on time, 20 percent collected one month late)

Medical examinations: January, \$35,610; February, \$41,840; and March, \$45,610

Special aerobics classes: January, \$4,020; February, \$5,130; and March, \$7,130

High-protein food sales: January, \$4,890; February, \$5,130; and March, \$6,280

Cash Payments: First Quarter, 20x4

Salaries and wages:

Corporate officers: 2 at \$12,000 per month

Medical doctors: 2 at \$7,000 per month

Nurses: 3 at \$2,900 per month

Clerical staff: 2 at \$1,500 per month

Aerobics instructors: 3 at \$1,100 per month

Clinic staff: 6 at \$1,700 per month

Maintenance staff: 3 at \$900 per month

Health food servers: 3 at \$750 per month

Purchases:

Muscle-toning machines: January, \$14,400; February, \$13,800; and March, \$0

Pool supplies: \$520 per month

Health food: January, \$3,290; February, \$3,460; and March, \$3,720

Medical supplies: January, \$10,400; February, \$11,250; and March, \$12,640

Medical clothing: January, \$7,410; February, \$3,900; and March, \$3,450

Medical equipment: January, \$11,200; February, \$3,400; and March, \$5,900

Advertising: January, \$2,250; February, \$1,190; and March, \$2,450

Utilities expense: January, \$5,450; February, \$5,890; and March, \$6,090

Insurance:

Fire: January, \$3,470

Liability: March, \$3,980

Property taxes: \$3,760 due in January

Federal income taxes: 20x3 taxes of \$21,000 due in March 20x4

Miscellaneous: January, \$2,625; February, \$2,800; and March, \$1,150

The beginning cash balance for 20x4 is anticipated to be \$9,840.

REQUIRED

Prepare a cash budget for Thomas's Wellness Centers, Inc., for the first quarter of 20x4. Use the following column headings:

Item	January	February	March	Total
------	---------	----------	-------	-------

ALTERNATE PROBLEMS
P 6.
LO 3 Budgeted Income Statement


Roxana Sims is the budget director for Walker House, Inc., a multinational company based in Maryland. Walker House, Inc., organizes and coordinates art shows and auctions throughout the world. Budgeted and actual costs and expenses for 20x4 are compared in the following schedule.

Expense Item	20x4 Amounts	
	Budget	Actual
Salaries expense, staging	\$ 480,000	\$ 512,800
Salaries expense, executive	380,000	447,200
Travel costs	640,000	652,020
Auctioneer services	540,000	449,820
Space rental costs	251,000	246,580
Printing costs	192,000	182,500
Advertising expense	169,000	183,280
Insurance, merchandise	84,800	77,300
Insurance, liability	64,000	67,100
Home office costs	209,200	219,880
Shipping costs	105,000	112,560
Miscellaneous	25,000	25,828
Total expenses	<u>\$3,140,000</u>	<u>\$3,176,868</u>
Net receipts	<u>\$6,200,000</u>	<u>\$6,369,200</u>

For 20x5, the following fixed costs have been budgeted: executive salaries, \$440,000; advertising expense, \$190,000; merchandise insurance, \$80,000; and liability insurance, \$68,000. Additional information follows.

- Net receipts are expected to be \$6,400,000 in 20x5.
- Salary expenses for staging will increase 20 percent over actual figures for 20x4.
- Travel costs are expected to be 11 percent of net receipts.
- Auctioneer services will be billed at 9.5 percent of net receipts.
- Space rental costs will go up 20 percent from 20x4 budgeted amounts.
- Printing costs are expected to be \$190,000 in 20x5.
- Home office costs are budgeted for \$230,000 in 20x5.
- Shipping costs are expected to rise 20 percent over 20x4 budgeted amounts.
- Miscellaneous expenses for 20x5 will be budgeted at \$28,000.

REQUIRED

- Prepare the company's budgeted income statement for 20x5. Assume that only services are being sold and that there is no cost of sales. (Net receipts equal gross margin.) Use a 34 percent federal income tax rate.
- Should the budget director be worried about the trend in the company's operations? Be specific.

LO 4 Basic Cash Budget


- P 7.** Market Produce, Inc., is the creation of Tom Gruca. Gruca's dream was to develop the biggest produce store with the widest selection of fresh fruits and vegetables in northern New Jersey. In three years, he accomplished his objective. Eighty percent of his business is conducted on credit with area retail enterprises, and 20 percent of the produce sold is to walk-in customers at his retail outlet on a cash only basis.

Collection experience has shown that 50 percent of all credit sales are collected during the month of sale, 30 percent are received in the month following the sale, and 20

percent are collected in the second month after the sale. Gruca has asked you to prepare a cash budget for the quarter ending September 30, 20x3.

Operating data for the period are as follows: Total sales in May were \$66,000, and in June, \$67,500. Anticipated sales include July, \$69,500; August, \$76,250; and September, \$84,250. Purchases for the quarter are expected to be \$43,700 in July; \$48,925 in August; and \$55,725 in September. All purchases are for cash.

Other projected costs for the quarter include salaries and wages of \$18,370 in July, \$19,200 in August, and \$20,300 in September; and monthly costs of \$1,040 for heat, light, and power; \$375 for bank collection fees; \$1,925 for rent; \$1,120 for supplies; \$1,705 for depreciation of equipment; \$1,285 for equipment repairs; and \$475 for miscellaneous expenses. The corporation's cash balance at June 30, 20x3, was \$2,745.

REQUIRED

1. Prepare a cash budget by month for the quarter ending September 30, 20x3.
2. Should Market Produce Inc., anticipate taking out a loan during the quarter? How much should be borrowed? When? (Note: Management has a \$1,500 minimum monthly cash balance policy.)

- P 8.** The Bank of the West has asked the president of Runnymede Products, Inc., for a budgeted income statement and budgeted balance sheet for the quarter ending June 30, 20x1. The documents will be used to support the company's request for a loan. A quarterly master budget is routinely prepared by the company, so the president indicated that the requested documents would be forwarded to the bank.

To date (April 2), the following operating budgets have been developed: Sales: April, \$220,400, May, \$164,220, and June, \$165,980; direct materials purchases for the period, \$96,840; direct materials usage, \$102,710; direct labor expenses, \$71,460; manufacturing overhead, \$79,940; selling and administrative expenses, \$143,740; capital expenditures, \$125,000 (to be spent on June 29); cost of goods manufactured, \$252,880; and cost of goods sold, \$251,700.

Balance sheet account balances at March 31, 20x1 were: Cash, \$28,770; Accounts Receivable, \$26,500; Materials Inventory, \$23,910; Work in Process Inventory, \$31,620; Finished Goods Inventory, \$36,220; Prepaid Expenses, \$7,200; Plant, Furniture, and Fixtures, \$498,600; Accumulated Depreciation, Plant, Furniture, and Fixtures, \$141,162; Patents, \$90,600; Accounts Payable, \$39,600; Notes Payable, \$105,500; Common Stock, \$250,000; and Retained Earnings, \$207,158.

Monthly cash balances for the quarter are projected to be: April 30, \$20,490; May 31, \$35,610; and June 30, \$45,400. During the quarter, accounts receivable are supposed to increase by 30 percent, patents will go up by \$6,500, prepaid expenses will remain constant, accounts payable will go down by 10 percent, and the company will make a \$5,000 payment on the note payable (\$4,100 is principal reduction). The federal income tax rate is 34 percent, and the second quarter's tax is paid in July. Depreciation for the quarter will be \$6,420, which was already included in the manufacturing overhead budget. No dividends were paid.

REQUIRED

1. Prepare a budgeted income statement for the quarter ending June 30, 20x1. Round answers to the nearest dollar.
2. Prepare a budgeted balance sheet as of June 30, 20x1.

LO 3 Budgeted Financial LO 5 Statements



EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

LO 1 The Budgeting Process

LO 2

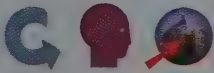


- SD 1.** Many organizations believe the budgeting process is wasteful and ineffective. Managers and employees can spend too much time focusing on budgeting mechanics rather than on strategic issues. They can also forget to review nonvalue-adding activities that waste resources. Finally, they may select budget information and use budget formats that fail to communicate the short-term business activities needed to achieve long-term goals. Place yourself in the role of a budget director for a company. Prepare a memorandum to the company's owner justifying the need for budgeting. Also suggest ways to make the budgeting process, the budget information, and the budgets themselves efficient, effective, and meaningful. (Note: For help in completing this assignment, look for the article written by Jeffrey A. Schmidt, "Is It Time to Replace Traditional Budgeting?" *Journal of Accountancy*, October 1992, located on the Needles Accounting Resource Center web site at <http://college.hmco.com>.)



Group Activity: Ask students to complete the assignment individually. Then have students work in groups to prepare (1) an argument justifying the use of budgeting and (2) a list of ways to make the budgeting process, the budget information, and the budgets efficient, effective, and meaningful. Select one person from each group to report the group's findings to the class.

LO 4 Comparison of Cash Budgeting Challenges



- SD 2.** The nature of a company's business affects its need to budget for cash flows. **H & R Block** is a service company whose main business is preparing tax returns. Most tax returns are prepared after January 31 and before April 15. For a fee and interest, the company will advance cash to clients who are due refunds. The clients are then expected to repay the cash advances when they receive their refunds. Although the company has some revenues throughout the year, most of the nontax season is devoted to training potential employees in tax preparation procedures and to laying the groundwork for the next tax season.

Toys "R" Us is a toy retailer whose sales are concentrated in the last three months of one year and January of the next year. The company sells very few products on credit. Sales continue at a steady but low level during the rest of the year. Purchases of inventory are concentrated in the period from July to September.

Mitsubishi manufactures large-screen TVs and other electronic products. Its sales tend to be concentrated in the last six months of the year. The company sells to dealers, who in turn sell to retail customers. The company offers credit terms of 60 to 90 days to the dealers. In addition, when a dealer makes a sale to a qualified buyer, Mitsubishi offers the buyer a very generous credit deal that features no payments or interest for one year after the date of sale.

What is a cash budget? For each of the three companies described, discuss the nature of cash receipts and cash disbursements over the period of a calendar year. In each case, what are some key estimates that management must make when preparing a cash budget?



Communication



Critical Thinking



Ethics



Group Activity



Hot Links to Real Companies



International



Internet



Memo



Spreadsheet

Ethical Dilemma**SD 3.**

Gus Kamp is the manager of the Repairs and Maintenance Department, a cost center at *Phoenix Industries*. Kamp is responsible for preparing the annual budget for his department. For 20x2, he turned in the following budget information to the company's budget director. The 20x2 figures are 20 percent above the 20x1 budget figures. Most managers in the company inflate their budget numbers by at least 10 percent because their bonuses depend upon how much below budget they operate.

Cost Category	Budget 20x1	Actual 20x1	Budget 20x2
Supplies	\$ 20,000	\$ 16,000	\$ 24,000
Labor	80,000	82,000	96,000
Utilities	8,500	8,000	10,200
Tools	12,500	9,000	15,000
Hand-carried equipment	25,000	16,400	30,000
Cleaning materials	4,600	4,200	5,520
Miscellaneous	2,000	2,100	2,400
Totals	<u>\$152,600</u>	<u>\$137,700</u>	<u>\$183,120</u>

The director has questioned some of the numbers. Kamp defended them by saying that he expects a significant increase in repairs and maintenance activity in 20x2.

What are the real reasons for the increased budgeted amounts? What ethical considerations enter into this situation?

Research Activity**SD 4.**

Assume you are the manager of a student group's major fundraising activity, which is the baking and sale of chocolate chip cookies at the school's fall home football games. There are five home games. Packages of two dozen cookies are sold for \$5.00. You estimate that 500 packages will be baked each week, of which 96 percent will be sold. Half are sold by alumni volunteers, who receive no compensation, and half are sold by students, who receive a commission of \$.50 per package. The packaging costs \$.75 each. You plan to run an advertisement in the school newspaper before each game that costs \$200. Tools and supplies, such as pots and pans, will last the entire season and will cost \$500. Before each game, the cookies are mixed, baked, and assembled in a school kitchen for a fixed fee of \$300 per session, which is paid at the time of use. Workers are also paid a total of \$150 to help with the cleanup after each baking session. The recipe for the four dozen cookies is as follows:

2 1/4 cups all-purpose flour	3/4 cup granulated sugar	2 cups semisweet chocolate
1 teaspoon baking soda	3/4 cup brown sugar	chips
1 teaspoon salt	1 teaspoon vanilla extract	1 cup walnuts
2 sticks butter	2 eggs	

Research the prices of the cookie ingredients at a local supermarket. Then develop a budget for the sales and costs for the five games. What is your assessment of the fundraising effort?

Decision-Making Practice**SD 5.**

During the past ten years, *Squizzero Enterprises* has practiced participative budgeting that includes everyone from maintenance personnel to the president's staff. Gradually, however, the objective of budgeting honestly and in the best interest of the company as a whole has given way to budgeting to benefit individual divisions. Ralph Banerjee, the corporate controller, has asked Maggie Neff, the budget director, to carefully analyze this year's divisional budgets before incorporating them into the company's master budget.

The Motor Division was the first of six divisions to submit its 20x5 budget request to the corporate office. Its summary income statement and notes appear on the next page.

LO 1 Ethical Considerations in
LO 2 the Budgeting Process

LO 3

LO 3 Development of Budget



LO 2 Effective Budgeting
LO 3 Procedures



Squizzero Enterprises
Motor Division
Budgeted Income Statement
For the Years Ended December 31, 20x4 and 20x5

	Budget 12/31/x4	Budget 12/31/x5	Increase (Decrease)
Net Sales			
Radios	\$ 850,000	\$ 910,000	\$ 60,000
Appliances	680,000	740,000	60,000
Telephones	270,000	305,000	35,000
Miscellaneous	84,400	90,000	5,600
Net Sales	<u>\$1,884,400</u>	<u>\$2,045,000</u>	<u>\$160,600</u>
Less Cost of Goods Sold	<u>750,960</u>	<u>717,500¹</u>	<u>(33,460)</u>
Gross Margin	<u>\$1,133,440</u>	<u>\$1,327,500</u>	<u>\$194,060</u>
Operating Expenses			
Wages			
Warehouse	\$ 94,500	\$ 102,250	\$ 7,750
Purchasing	77,800	84,000	6,200
Delivery/Shipping	69,400	74,780	5,380
Maintenance	42,650	45,670	3,020
Salaries			
Supervisory	60,000	92,250	32,250
Executive	130,000	164,000	34,000
Purchases, Supplies	17,400	20,500	3,100
Merchandise Moving Equipment			
Maintenance	72,400	82,000	9,600
Depreciation	62,000	74,750 ²	12,750
Building Rent	96,000	102,500	6,500
Sales Commissions	188,440	204,500	16,060
Insurance			
Fire	12,670	20,500	7,830
Liability	18,200	20,500	2,300
Utilities	14,100	15,375	1,275
Taxes			
Property	16,600	18,450	1,850
Payroll	26,520	41,000	14,480
Miscellaneous	4,610	10,250	5,640
Total Operating Expenses	<u>\$1,003,290</u>	<u>\$1,173,275</u>	<u>\$169,985</u>
Income from Operations	<u>\$ 130,150</u>	<u>\$ 154,225</u>	<u>\$ 24,075</u>

1. Less expensive merchandise will be purchased in 20x5 to boost profits.
2. Depreciation is increased because additional equipment must be bought to handle increased sales.

1. Recast the Motor Division's budgeted income statement into the following format (round percentages to two places):

Account	Budget—12/31/x4		Budget—12/31/x5	
	Amount	Percent of Sales	Amount	Percent of Sales

2. Actual results for 20x4 revealed the following information about revenues and cost of goods sold.

	Amount	Percent of Sales
Net Sales		
Radios	\$ 780,000	43.94%
Appliances	640,000	36.06
Telephones	280,000	15.77
Miscellaneous	75,000	4.23
Net Sales	<u>\$1,775,000</u>	<u>100.00%</u>
Less Cost of Goods Sold	<u>763,425</u>	<u>43.01</u>
Gross Margin	<u><u>\$1,011,575</u></u>	<u><u>56.99%</u></u>

On the basis of this information and your analysis in 1, what should the budget director say to the managers of the Motor Division? Mention specific areas of the budget that may need to be revised and give your reasons.

MANAGERIAL REPORTING AND ANALYSIS

Interpreting Management Reports

MRA 1. *Husin Corporation* is a manufacturing company with annual sales of \$25,000,000. The controller, Victor Subroto, appointed Yolanda Alvillar as budget director. She created the following budget formulation policy based on a calendar-year accounting period.

- May 20x2 Meeting of corporate officers and budget director to discuss corporate plans for 20x3.
- June 20x2 Meeting(s) of division managers, department heads, and budget director to communicate 20x3 corporate objectives. At this time, relevant background data are distributed to all managers and a time schedule is established for development of 20x3 budget data.
- July 20x2 Managers and department heads continue to develop budget data. Complete 20x3 monthly sales forecasts by product line and receive final sales estimates from sales vice president.
- Aug. 20x2 Complete 20x3 plans for monthly production activity and anticipated inventory levels. Division managers and department heads should communicate preliminary budget figures to budget director for coordination and distribution to other operating areas.
- Sept. 20x2 Development of preliminary 20x3 master budget. Revised budget data from all functional areas to be received. Budget director will coordinate staff activities, including the integration of labor requirements, direct materials and supplies requirements, unit cost estimates, cash requirements, and profit estimates, and prepare preliminary 20x3 master budget.
- Oct. 20x2 Meeting with corporate officers to discuss preliminary 20x3 master budget. Corporate officers should communicate any corrections, additions, or deletions to budget director. All authorized changes to be incorporated into the 20x3 master budget.
- Nov. 20x2 Submit final draft of 20x3 master budget to corporate officers for approval. Publish approved budget and distribute to all corporate officers, division managers, and department heads.

REQUIRED

1. Comment on the proposed budget formulation policy.
2. What changes in the policy would you recommend?

Formulating Management Reports

MRA 2. Assume that you have just signed a partnership agreement with your cousin Eddie to open a bookstore near the college campus. You believe that you will be able to provide excellent service at prices lower than your local competition. To begin operations, you and Eddie have decided to apply for a loan from the Small Business Administration (SBA). Part of the application requires you to submit financial statements forecasting

LO 1 Interpreting Budget Formulation Policies



LO 1 Budgeted Financial LO 2 Statement Preparation

LO 3



the bookstore's first two years of operating activity and its financial position at the end of the second year. The application is due within six weeks. Because of your expertise in accounting and business, Eddie has asked you to develop the budgeted financial statements.

REQUIRED

1. List the budgeted financial statements and supporting schedules you believe you must prepare.
2. Who needs the budgeted financial statements?
3. Why are you preparing budgeted financial statements?
4. What information do you need to develop on the budgeted financial statements? How will you obtain the information?
5. When must you have the budgeted financial statements prepared?
6. In what ways can you and Eddie use the budgeted financial statements that you have prepared?

International Company**MRA 3.****LO 4 Goals and the Budgeting Process**

3M manufactures a variety of products ranging from office supplies to household sponges and laser imagers for CAT scanners to reflective materials for roads. Because of the company's aggressive research and development activities, many of its products have been redesigned to satisfy the needs of Asian customers. Business has been so successful that sales in the Asia-Pacific division of 3M have doubled in the past five years. Facilities are in Malaysia, South Korea, India, Thailand, and Taiwan.⁵

Based on 3M's strategic plan for next year, two goals for the Asia-Pacific division have been developed. They include a 25 percent growth in sales volume and the construction of a \$14 million manufacturing plant in Shanghai that will begin operations in the third quarter of the year.

REQUIRED

The manager for the Asia-Pacific Division is preparing the cash budget for next year's operations. How would the budgeted cash receipts and cash payments on the cash budget be affected by the two goals?

Excel Spreadsheet Analysis**MRA 4.****LO 2 The Budgeting Process**

Refer to the Hi-Flyer Company's master budget presented in this chapter for the year ending December 31, 20x1. Skye King has decided to increase the budgeted sales in the first quarter by 5,000 units to reflect sales to a new customer in Canada. The expenses for this sale will include direct materials, direct labor, variable manufacturing overhead, and variable selling and administrative expenses. The delivery expense for the Canadian customer will be \$.18 per unit rather than the regular \$.08 per unit. The desired units of beginning finished goods inventory will remain at 1,000 units.

REQUIRED

Use the Excel Templates software and the changes stated above to complete the following:

1. Prepare a revised budgeted income statement and supporting operating budgets.
2. What was the change in income from operations? Would you recommend accepting the order? Why?

Internet Case**MRA 5.****LO 1 The Budgeting Process**

Managers of the HON Company and HON Industries use relevant operational information to prepare quarterly budgets for the next year. HON's web site presents the actual results of some of the long-term and short-term plans that were originally included in company budgets. Prepare a short report that includes a list of the historical or planned events, activities, or factors that would influence the information in

the next period's budget for HON Industries. Conduct your research by reviewing the Decision Point in this chapter, the *Management Accounting* article on which the Decision Point is based, and the most recent operations review in the Investor Relations section of the HON Industries web site (see the Needles Accounting Resource Center web site at <http://college.hmco.com> for access to these materials).

ENDNOTES

1. Ralph Drtina, Steve Hoeger, and John Schaub, "Continuous Budgeting at the HON Company," *Management Accounting*, Institute of Management Accountants, January 1996.
2. Adapted from Larry Ponemon, "Building an Effective Business Ethics Process," *Management Accounting*, Institute of Management Accountants, June 1996.
3. From "Budgeting for an International Business," by Paul V. Mannino and Ken Milani. *Management Accounting*, February 1992, p. 39. Reprinted courtesy of the Institute of Management Accountants.
4. John Case, "Opening the Books," *Harvard Business Review*, March–April 1997.
5. "3M: Business Booms in Asia," *Asian Business*, Vol. 29, No. 22, February 1993.

Performance Measurement Using Standard Costing

LEARNING OBJECTIVES

- 1** Define *standard costs* and describe how managers use standard costs in the management cycle.
- 2** Identify the six elements of, and compute, a standard unit cost.
- 3** Describe how to control costs through variance analysis.
- 4** Compute and analyze direct materials variances.
- 5** Compute and analyze direct labor variances.
- 6** Define and prepare a flexible budget.
- 7** Compute and analyze manufacturing overhead variances.
- 8** Explain how variances are used to evaluate managers' performance.



DECISION POINT: A MANAGER'S FOCUS



The Rubicon Group

The Rubicon Group, of Oak Brook, Illinois, is an employee-owned consulting company that specializes in identifying computer hardware, software, and process-support solutions to business problems. It designs and installs comprehensive distribution, financial, and manufacturing software systems. One of the company's specialties is cost control. As part of its service in this area, Rubicon provides clients with current and standard cost updates, a comprehensive cost worksheet package, a variance report tracking standard and actual costs, and a gross profit and price evaluation. For manufacturers, the cost control analysis looks at current and standard costs for machine setup, materials, labor, and variable and fixed manufacturing overhead. Rubicon's cost control system can track variances for an individual part, specific routed parts, or all parts manufactured by a client company. The company's operating manual states that its cost control system "offers users both the tools and the flexibility to establish, analyze, and report the following financial management functions: standard cost generation, cost inquiries, and evaluation of cost changes."¹ How can those three functions aid management in performance measurement?

Creating a set of standard costs provides management with benchmarks to use in measuring performance in controlling operating costs. The standard costs serve as targets against which actual spending trends can be compared and analyzed. Cost inquiries are used to continuously monitor market prices and changes in operating costs. If the changes are permanent, they are used to update standard costs. The evaluation of changes in costs provides management with information about the causes of variances. Once the cause of a variance is known, management can decide how to correct any related operating problem.

Standard Costs in Today's Business Environment

OBJECTIVE

1 Define *standard costs* and describe how managers use standard costs in the management cycle

Standard costing is a budgetary control technique with three components: a standard, or predetermined, performance level; a measure of actual performance; and a measure of the difference, or **variance**, between the standard and the actual. Standard costing may be used in any type of business. **Standard costs** are realistically predetermined costs that are developed from analyses of both past and projected future costs and operating conditions. They are usually stated in terms of cost per unit of finished product or service provided.

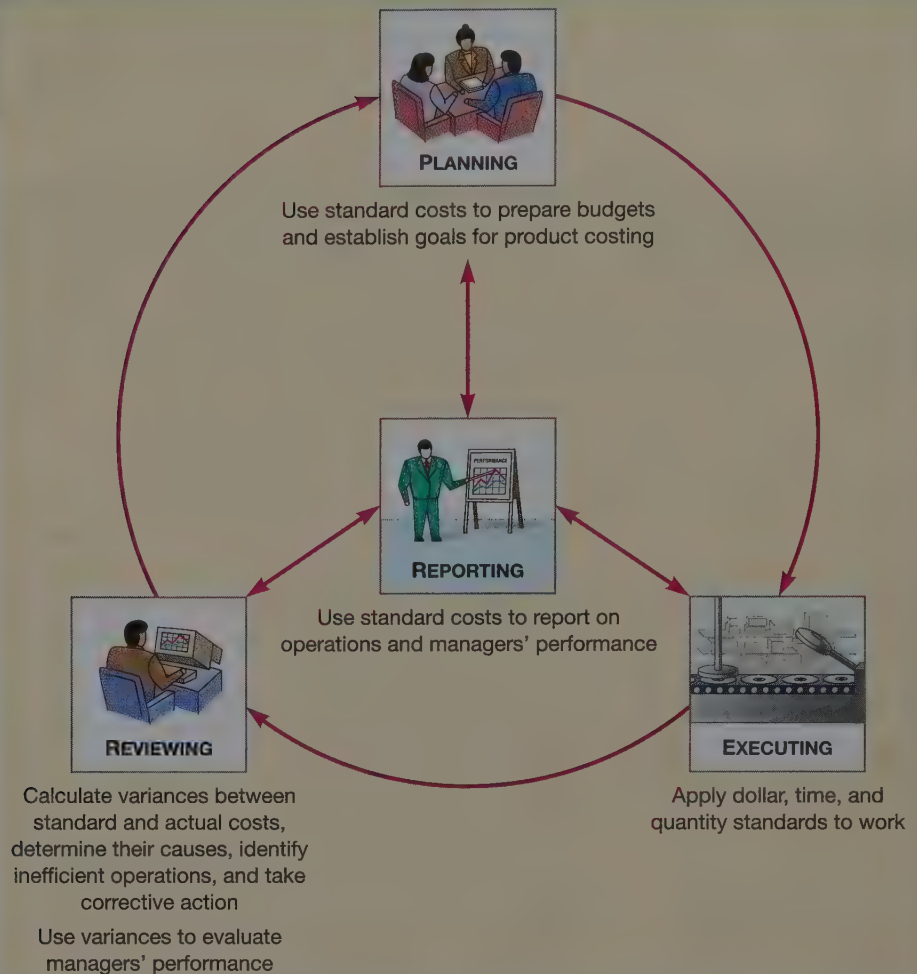
In a manufacturing company, standard costs may be used with either job order costing, process costing, or activity-based costing systems. Standard costs for direct materials, direct labor, and manufacturing overhead flow through the inventory accounts and eventually into cost of goods sold. The difference from normal costing systems is that under standard costing systems, standard costs instead of actual costs are used to record all of these flows.

Standard Costs and the Management Cycle

Once standard costs have been developed, managers use them as tools for cost planning and control. Figure 1 shows how standard costs are used during the management cycle.

- PLANNING** During the planning stage, after projected sales and production targets for the upcoming year have been established, standard costs can be used to estimate costs for direct materials, direct labor, and variable manufacturing overhead. The estimated costs serve as goals for product costing. They can also be used in product distribution and pricing. Standard costs not only aid in the development of budgets, but also serve as yardsticks for evaluating capital expenditures. If the price a vendor charges differs from the anticipated standard price, the manager should question the difference.
- EXECUTING** During the executing stage, dollar, time, and quantity standards are applied to the work being done.
- REVIEWING** The reviewing stage occurs at the end of the accounting period—whether it be a week, a month, or a quarter. At that time, the actual costs incurred are compared with standard costs, and the variances are computed. Variances provide measures of performance that can be used to control costs. In reviewing variances, managers should consider the amount of a variance as one measure of significance. But they should also look beyond the amount of a variance and try to determine the variance's cause or causes. By analyzing the causes of unfavorable variances, managers can identify inefficient functions within departments or work cells and take action to improve them. Managers should also investigate favorable variances to determine why and how the positive performance occurred. Favorable variances may indicate desirable practices that should be implemented elsewhere or a need to revise the standards. Both favorable and unfavorable variances from standard costs can be used to evaluate an individual manager's performance.
- REPORTING** During the reporting stage, standard costs are used to report on operations and managerial performance. When a variance report is tailored to a manager's specific responsibilities, it will provide much useful information about how well operations are proceeding and how well the manager is controlling them.

Figure 1
Standard Costing, Variance Analysis, and the Management Cycle



Relevance of Standard Costing

Standard costing has traditionally been used to measure and evaluate operating performance in manufacturing settings. Today, however, managers in service organizations, such as Bank of America and Liberty Mutual Insurance Company, can also use standard costing. In terms of standard costing, the only difference between a manufacturing company and a service organization is that the service organization has no direct materials costs. However, labor and overhead costs are very much a part of providing services and must be planned and controlled. Therefore, managers in service organizations can also use standard costs and measure performance through variance analysis.

In today's globally competitive manufacturing environment, managers are using new approaches to performance evaluation. Instead of concentrating exclusively on production efficiency and cost control, they are also concerned with reducing processing time and improving quality, customer satisfaction, and the number of on-time deliveries. This approach requires new measures of performance that track processing time, quality, customer responses, and delivery results. The importance of labor-related standard costs and variances has been

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United Parcel Service (UPS) uses standards to set performance levels for all functions. For instance, company engineers determined that three feet per second was the pace at which delivery truck drivers should walk to the door of a customer. The objective of the standards is to achieve a predetermined number of deliveries per hour.²

reduced because direct labor costs have dropped significantly. However, standard costs and variance analysis are still very much in use for direct materials and manufacturing overhead.

The Development of Standard Costs

OBJECTIVE

2 Identify the six elements of, and compute, a standard unit cost

Standard costing is a total unit cost concept that includes all three elements of manufacturing cost. In a fully integrated standard costing system, standard costs replace all actual manufacturing costs for direct materials, direct labor, and manufacturing overhead. Accounts such as Materials Inventory, Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold are maintained and reported in terms of standard costs. All inventory balances are computed using standard unit costs. The management accountant keeps separate records of actual costs to compare what should have been spent (the standard costs) with the actual costs incurred.

The computation of standard costs is more detailed than that of predetermined overhead costs. Whereas predetermined overhead rates are usually based on past costs, standard costs are based on engineering estimates, forecasted demand, worker input, time and motion studies, and type and quality of direct materials. One drawback to standard costing is that it is expensive to use. Because predetermined overhead rate provides some of the same data as a standard overhead rate, a company that cannot afford to implement standard costing should continue to use predetermined overhead rates.

A standard unit cost for a manufactured product has six parts: (1) the direct materials price standard, (2) the direct materials quantity standard, (3) the direct labor time standard, (4) the direct labor rate standard, (5) the standard variable manufacturing overhead rate, and (6) the standard fixed manufacturing overhead rate. To develop a standard unit cost, we must identify and analyze each of those elements. For service organizations, only the last four apply because those organizations do not use direct materials in their operations.

Standard Direct Materials Cost

The **standard direct materials cost** is found by multiplying the standard price for direct materials by the standard quantity for direct materials. If the standard price for a certain item is \$2.75 and a specific job calls for a standard quantity of 8 of the items, the standard direct materials cost for that job is as follows:

$$\begin{aligned} \text{Standard Direct} &= \text{Direct Materials} \times \text{Direct Materials} \\ \text{Materials Cost} &= \text{Price Standard} \times \text{Quantity Standard} \\ \$22.00 &= \$2.75 \times 8 \end{aligned}$$

The **direct materials price standard** is a careful estimate of the cost of a specific direct material in the next accounting period. The purchasing agent is responsible for developing price standards for all direct materials. When estimating a direct materials price standard, the purchasing agent must take into account all possible price increases, changes in available quantities, and new sources of supply. The purchasing agent also makes the actual purchases.

The **direct materials quantity standard** is an estimate of the amount of direct materials expected to be used. It is influenced by product engineering specifications, the quality of direct materials, the age and productivity of machinery, and

the quality and experience of the work force. Some scrap and waste may be unavoidable; if so, they are included in the estimate. Production managers or management accountants usually establish and monitor direct materials quantity standards, although engineers, purchasing agents, and machine operators may contribute to the development of these standards.

Standard Direct Labor Cost

The **standard direct labor cost** for a product, task, or job order is calculated by multiplying the standard wage for direct labor by the standard hours of direct labor. If a product takes 1.5 standard direct labor hours to produce and the standard direct labor rate is \$8.40 per hour, then the product's standard direct labor cost is as follows:

$$\begin{aligned}\text{Standard Direct Labor Cost} &= \text{Direct Labor Rate Standard} \times \text{Direct Labor Time Standard} \\ \$12.60 &= \$8.40 \times 1.5 \text{ hours}\end{aligned}$$

Standard labor rates are fairly easy to develop because labor rates are either set by a labor contract or defined by the company. **Direct labor rate standards** are the hourly direct labor costs that are expected to prevail during the next accounting period for each function or job classification. Although rate ranges are established for each type of worker and rates vary within those ranges based on each worker's experience and length of service, an average standard rate is developed for each task. Even if the person actually making the product is paid more or less than the standard rate, the standard rate is used to calculate the standard direct labor cost.

The **direct labor time standard** is the expected time required for each department, machine, or process to complete the production of one unit or one batch of output. Current time and motion studies of workers and machines as well as past employee and machine performance are the basic input for the development of this standard. In many cases, standard time per unit is a small fraction of an hour. The direct labor time standard should be revised whenever a machine is replaced or the quality of the labor force changes. Meeting time standards is the responsibility of the department manager or supervisor.

Standard Manufacturing Overhead Cost

The **standard manufacturing overhead cost** is the sum of the estimates for variable and fixed manufacturing overhead costs in the next accounting period. It is based on standard rates computed in much the same way as the predetermined manufacturing overhead rate discussed earlier. One important difference, however, is that the standard manufacturing overhead rate is made up of two parts, one for variable costs and one for fixed costs. The reason for computing the standard variable and fixed manufacturing overhead rates separately is that different application bases are generally required. The **standard variable manufacturing overhead rate** is total budgeted variable manufacturing overhead costs divided by an expression of capacity, such as the expected number of standard machine hours or standard direct labor hours. [Other bases may be used if machine hours or direct labor hours are not good predictors (or drivers) of variable manufacturing overhead costs.] Using standard machine hours as the basis, the formula is:

$$\begin{aligned}\text{Standard Variable Manufacturing Overhead Rate} &= \frac{\text{Total Budgeted Variable Manufacturing Overhead Costs}}{\text{Expected Number of Standard Machine Hours}}\end{aligned}$$

The **standard fixed manufacturing overhead rate** is total budgeted fixed manufacturing overhead costs divided by an expression of capacity, usually normal capacity in terms of standard hours or units. The denominator is expressed in the same terms (direct labor hours, machine hours, and so forth) as the variable manufacturing overhead rate. The formula is:

$$\text{Standard Fixed Manufacturing Overhead Rate} = \frac{\text{Total Budgeted Fixed Manufacturing Overhead Costs}}{\text{Normal Capacity in Terms of Standard Machine Hours}}$$

Using normal capacity as the application basis ensures that all fixed manufacturing overhead costs have been applied to units produced by the time normal capacity is reached. Recall that normal capacity is the level of operating capacity needed to meet the expected sales demand.

Using Standards to Determine Total Unit Cost

Using standard costs eliminates the need to calculate unit costs from actual cost data every week or month or for each batch of goods produced. Once standard costs for direct materials, direct labor, and manufacturing overhead are developed, a total standard unit cost can be computed at any time.

With standard cost elements, the following amounts are determined: (1) cost of purchased direct materials entered into Materials Inventory, (2) cost of direct materials requisitioned out of Materials Inventory and into Work in Process Inventory, (3) cost of direct labor charged to Work in Process Inventory, (4) cost of manufacturing overhead applied to Work in Process Inventory, (5) cost of goods completed and transferred to Finished Goods Inventory, and (6) cost of units sold and charged to Cost of Goods Sold. In other words, during the period, all transactions affecting the three inventory accounts and the Cost of Goods Sold account are expressed in terms of standard costs, no matter what actual costs were incurred.

For example, Bokinski Industries, Inc., uses a standard costing system. Recently, the company updated the standards for its line of automatic pencils. Direct materials price standards are \$9.20 per square foot for casing materials and \$2.25 for each movement mechanism. Direct materials quantity standards are .025 square foot of casing materials per pencil and one movement mechanism per pencil. Direct labor time standards are .01 hour per pencil for the Stamping Department and .05 hour per pencil for the Assembly Department. Direct labor rate standards are \$8.00 per hour for the Stamping Department and \$10.20 per hour for the Assembly Department. Standard manufacturing overhead rates are \$12.00 per direct labor hour for the standard variable manufacturing overhead rate and \$9.00 per direct labor hour for the standard fixed manufacturing overhead rate. The standard cost of making one automatic pencil would be computed in the following manner:

Direct materials costs	
Casing (\$9.20 per sq. ft. × .025 sq. ft.)	\$.23
One movement mechanism	2.25
Direct labor costs	
Stamping Department (\$8.00 per hour × .01 hour per pencil)	.08
Assembly Department (\$10.20 per hour × .05 hour per pencil)	.51
Manufacturing overhead	
Variable manufacturing overhead (\$12.00 per hour × .06 hour per pencil)	.72
Fixed manufacturing overhead (\$9.00 per hour × .06 hour per pencil)	.54
Total standard cost of one automatic pencil	<u>\$4.33</u>

Using Variance Analysis to Control Operations

OBJECTIVE

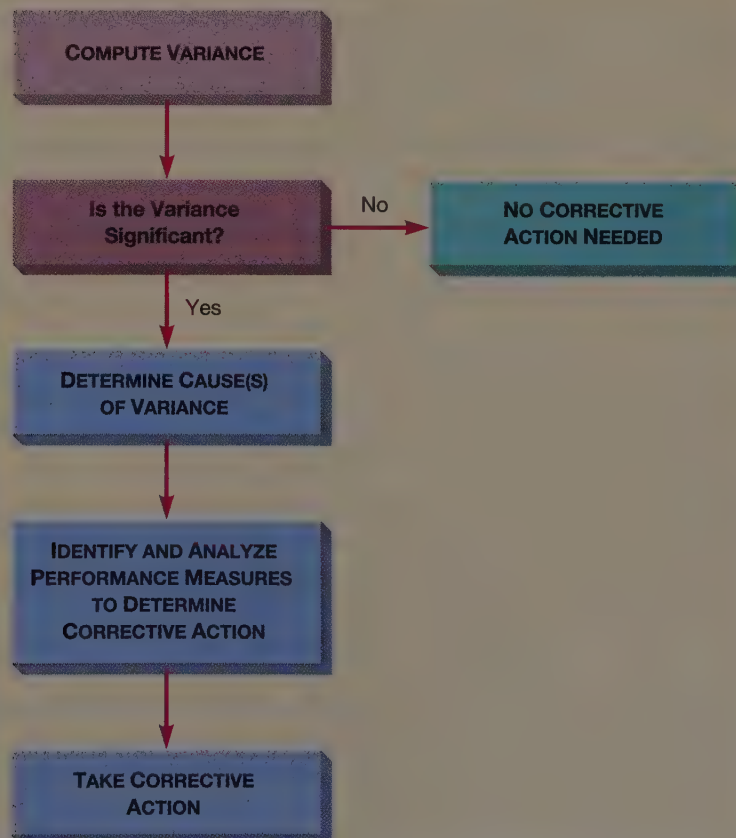
3 Describe how to control costs through variance analysis

Although a standard costing system can be useful in both the planning and the executing phases of the management cycle, it has traditionally been associated with cost control and the evaluation of operating performance. Managers of manufacturing operations, as well as those responsible for selling and service functions, constantly compare the costs of what was expected to happen with the costs of what did happen. By examining the differences—or variances—between standard and actual costs, managers can learn much valuable information.

Variance analysis is the process of computing the differences between standard (or budgeted) costs and actual costs and identifying the causes of those differences. But just identifying the cause(s) of a variance does not necessarily solve the problem. Therefore we will also discuss some financial and nonfinancial performance measures that can be used to track the cause of a problem and suggest possible ways to correct it.

Several steps are needed to get to the root of a problem and to correct it. As shown in Figure 2, first you must compute the variance. If the variance is insignificant, actual operating results are close to anticipated operating conditions and no corrective action is needed. If the variance is significant, the management accountant analyzes it to identify its cause. Knowing the cause of a variance usually helps the accountant pinpoint the areas or activities that need to be monitored. The accountant then chooses the best performance measures to track those activities, analyzes the results, and, in consultation with the manager of those activities, helps

Figure 2
Using Variance Analysis to
Control Costs



determine the action needed to correct the problem. The final step is to take the required corrective action.

As we focus on the variances related to direct materials, direct labor, and manufacturing overhead, we will follow the process outlined in Figure 2. Computing the amount of the variance is important. But it is also important to remember that identifying the amount of a variance does nothing to prevent it from occurring again in the future. Managers need to know the cause of a variance. We will identify many examples of operating problems that might cause each of the variances to occur. Once the cause is known, specific performance measures can be identified and analyzed to help the manager determine the best solution to the problem so corrective action can be taken.

Computing and Analyzing Variances

Management accountants compute variances for whole cost categories, such as total direct materials costs, and for elements of those categories, like the price of each direct material and the quantity of each direct material used. The more detailed an analysis is, the more effective it is in controlling costs. We will limit our analysis to six variances, two for each of the main cost categories of direct materials, direct labor, and manufacturing overhead. In practice, companies may use dozens of variances for many different types of activities to assist them in controlling and improving operating conditions.

Direct Materials Variances

OBJECTIVE

4 Compute and analyze direct materials variances

The **total direct materials cost variance** is the difference between the standard cost of direct materials and the actual cost incurred for those items. Let us assume, for example, that Ramos Company makes leather chairs. Each chair should use 4 yards of leather (standard quantity), and the standard price of leather is \$6.00 per yard. During August, Ramos Company purchased 760 yards of leather costing \$5.90 per yard and used the leather to produce 180 chairs. The total direct materials cost variance is calculated as follows:

Standard cost	
Standard price × standard quantity =	
\$6.00 per yard × (180 chairs × 4 yards per chair) =	
\$6.00 per yard × 720 yards =	\$4,320
Less actual cost	
Actual price × actual quantity =	
\$5.90 per yard × 760 yards =	4,484
Total direct materials cost variance	<u>\$ 164 (U)</u>

Here actual cost exceeds standard cost. The situation is unfavorable, as indicated by the *U* in parentheses after the dollar amount. An *F* means a favorable situation.

To find the area or people responsible for the variance, the total direct materials cost variance must be broken down into two parts: the direct materials price variance and the direct materials quantity variance. The **direct materials price variance** is the difference between the standard price and the actual price, multiplied by the actual quantity purchased. For Ramos Company, the direct materials price variance is computed as follows:

Standard price	\$6.00
Less actual price	<u>5.90</u>
Difference	<u>\$.10 (F)</u>

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The globally competitive business environment has caused managers in many companies to revise their costing systems—their standard costing systems in particular. In traditional systems, variance analysis focused on the efficient use of direct materials and direct labor. Defects and product rework were expected, and the anticipated amounts were incorporated into the standards. Excess production that built inventories was not penalized. Today, tracking product quality and avoiding inventory buildups are major concerns. Consequently, revised standard costing systems track product quality and rates of production as well as the efficient use of resources. Quality variances are computed to identify

the production costs wasted on defective units. One approach to calculating a quality variance is as follows:

$$\frac{(\text{Total Units Produced} - \text{Good Units Produced}) \times \text{Standard Cost per Unit}}$$

Overproduction is also frowned on in the new global operating environment. To help track overproduction, a production variance can be computed as follows:

$$\frac{(\text{Good Units Produced} - \text{Scheduled Units}) \times \text{Standard Cost per Unit}}$$

The two new variances can be incorporated into an existing standard costing system to monitor product defects and prevent overproduction. Direct materials price and quantity variances and direct labor rate and efficiency variances are still necessary to help measure the efficiency of resource usage.³

$$\begin{aligned} \text{Direct Materials Price Variance} &= (\text{Standard Price} - \text{Actual Price}) \times \text{Actual Quantity} \\ &= \$.10 \text{ (F)} \times 760 \text{ yards} \\ &= \underline{\underline{\$76 \text{ (F)}}} \end{aligned}$$

Because the direct materials purchased cost less than the standard cost, the variance is favorable.

The **direct materials quantity variance** is the difference between the standard quantity and the actual quantity used, multiplied by the standard price.

Standard quantity (180 chairs × 4 yards per chair)	720 yards
Less actual quantity	<u>760 yards</u>
Difference	<u><u>40 yards (U)</u></u>

$$\begin{aligned} \text{Direct Materials Quantity Variance} &= \text{Standard Price} \times (\text{Standard Quantity} - \text{Actual Quantity}) \\ &= \$6 \text{ per yard} \times 40 \text{ yards (U)} \\ &= \underline{\underline{\$240 \text{ (U)}}} \end{aligned}$$

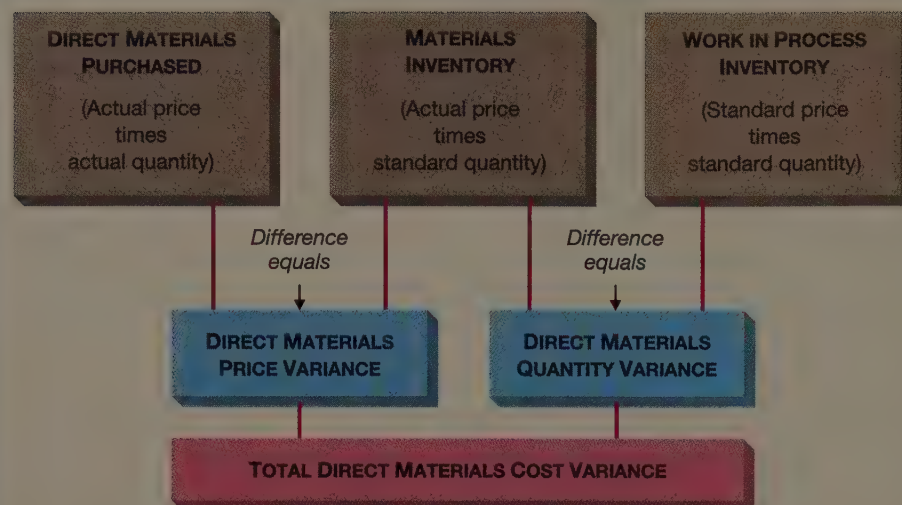
Because more leather than the prescribed amount was used, the direct materials quantity variance is unfavorable.

If the calculations are correct, the sum of the direct materials price variance and the direct materials quantity variance should equal the total direct materials cost variance.

Direct materials price variance	\$ 76 (F)
Direct materials quantity variance	<u>240 (U)</u>
Total direct materials cost variance	<u><u>\$164 (U)</u></u>

Sometimes cost relationships are easier to interpret in diagram form. Figure 3 illustrates the above analysis. Notice that direct materials are purchased at actual cost but entered into the Materials Inventory account at standard price; thus, the direct materials price variance of \$76 (F) is known when costs are entered into Materials Inventory. As shown in Figure 3, the standard quantity times the standard price is the amount entered into the Work in Process Inventory account.

Figure 3
Direct Materials Variance
Analysis



Using Data from the Ramos Company Illustration:

Actual Direct Materials Cost	Entered into Materials Inventory	Entered into Work in Process Inventory
Actual Price x Actual Quantity	Standard Price x Actual Quantity	Standard Price x Standard Quantity
\$5.90 per yd. x 760 yds. = \$4,484	\$6.00 per yd. x 760 yds. = \$4,560	\$6.00 per yd. x 720 yds. = \$4,320
Direct Materials Price Variance	Direct Materials Quantity Variance	
<u>\$76 (F)</u>	<u>\$240 (U)</u>	
Total Direct Materials Cost Variance		
<u><u>\$164 (U)</u></u>		

TAKING CORRECTIVE ACTION—RAMOS COMPANY Managers of the Ramos Company were concerned because the direct materials price variances and quantity variances in the production of leather chairs had been occurring for some time and because, as in our analysis, the price variances were always favorable and the quantity variances were always unfavorable. The purchasing manager had contacted vendors about possible price changes, but no changes had occurred. By tracking the purchasing activity for three months, the management accountant discovered that a lower grade of leather had been purchased at a reduced price. The managers of the Ramos Company had not given the purchasing agent any authorization for such a substitution. After a careful analysis, the manager of engineering determined that the substitute leather was not appropriate and that the company should return to purchasing the originally specified leather. Further analysis revealed that the unfavorable quantity variance was also caused by using the substitute leather. By tracking the purchasing activity, the managers at Ramos Company were able to solve the variance problem in the direct materials costs of producing leather chairs.

Direct Labor Variances

OBJECTIVE

5 Compute and analyze direct labor variances

The procedure for finding cost variances in direct labor parallels the procedure for finding variances in direct materials. The **total direct labor cost variance** is the difference between the standard direct labor cost for the good units produced and the actual direct labor costs incurred. (Good units are the total units produced less the units that are scrapped or need to be reworked.) At the Ramos Company, each chair requires 2.4 standard direct labor hours, and the standard direct labor rate is \$8.50 per hour. During August, 450 direct labor hours were used to make 180 chairs at an average pay rate of \$9.20 per hour. The total direct labor cost variance is computed below.

Standard cost	
Standard rate × standard hours allowed	=
\$8.50 per hour × (180 chairs × 2.4 hours per chair)	=
\$8.50 per hour × 432 hours	= \$3,672
Less actual cost	
Actual rate × actual hours = \$9.20 × 450 hours	= <u>4,140</u>
Total direct labor cost variance	<u>\$ 468 (U)</u>

Both the actual direct labor hours per chair and the actual direct labor rate varied from the standard. For effective performance evaluation, management must know how much of the total cost arose from different direct labor rates and how much from different numbers of direct labor hours. This information is found by computing the direct labor rate variance and the direct labor efficiency variance.

The **direct labor rate variance** is the difference between the standard direct labor rate and the actual direct labor rate, multiplied by the actual direct labor hours worked.

Standard rate	\$8.50
Less actual rate	<u>9.20</u>
Difference	<u>\$.70 (U)</u>

$$\begin{aligned}
 \text{Direct Labor Rate Variance} &= (\text{Standard Rate} - \text{Actual Rate}) \times \text{Actual Hours} \\
 &= \$.70 (\text{U}) \times 450 \text{ hours} \\
 &= \underline{\underline{\$315 (\text{U})}}
 \end{aligned}$$

The **direct labor efficiency variance** is the difference between the standard direct labor hours allowed for the good units produced and the actual direct labor hours worked, multiplied by the standard direct labor rate.

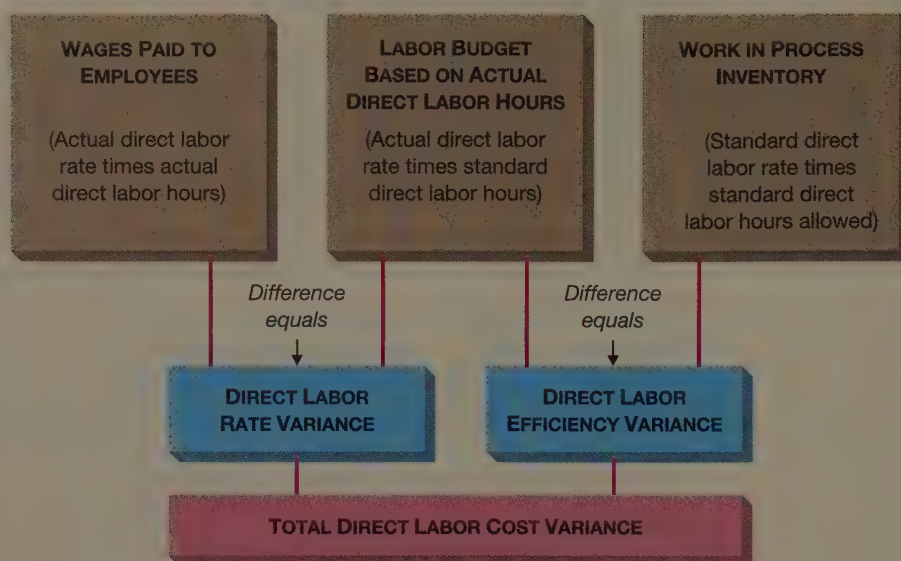
Standard hours allowed (180 chairs × 2.4 hours per chair)	432 hours
Less actual hours	<u>450 hours</u>
Difference	<u>18 hours (U)</u>

$$\begin{aligned}
 \text{Direct Labor Efficiency Variance} &= \text{Standard Rate} \times (\text{Standard Hours Allowed} - \text{Actual Hours}) \\
 &= \$8.50 \text{ per hour} \times 18 \text{ hours (U)} \\
 &= \underline{\underline{\$153 (\text{U})}}
 \end{aligned}$$

The following check shows that the direct labor rate and efficiency variances have been computed correctly:

Direct labor rate variance	\$315 (U)
Direct labor efficiency variance	<u>153 (U)</u>
Total direct labor cost variance	<u>\$468 (U)</u>

Figure 4
Direct Labor Variance Analysis



Using Data from the Ramos Company Illustration:

Actual Direct Labor Cost	Budgeted Direct Labor Cost at Actual Hours	Costs Entered into Work in Process Inventory
Actual Rate x Actual Hours	Standard Rate x Actual Hours	Standard Rate x Standard Hours Allowed
\$9.20 per hr. x 450 hrs. = \$4,140	\$8.50 per hr. x 450 hrs. = \$3,825	\$8.50 per hr. x 432 hrs. = \$3,672
Direct Labor Rate Variance	Direct Labor Efficiency Variance	
<u>\$315 (U)</u>	<u>\$153 (U)</u>	
Total Direct Labor Cost Variance		
<u><u>\$468 (U)</u></u>		

Figure 4 summarizes the direct labor variance analysis. Unlike direct materials variances, the direct labor rate and efficiency variances are usually computed and recorded at the same time, because direct labor is not stored in an inventory account before use. Data from Ramos Company in the lower portion of Figure 4 illustrate this approach to direct labor variance analysis.

TAKING CORRECTIVE ACTION—RAMOS COMPANY

Because both the direct labor rate variance and the direct labor efficiency variance were unfavorable, the management of Ramos Company wanted to find out their causes. By analyzing employee time cards, it was discovered that a machine operator from another department had taken the place of a chair assembly worker who was ill. The machine operator made \$9.20 per hour, whereas the assembly worker earned the standard \$8.50 per hour rate. When questioned about the unfavorable efficiency variance, the assembly supervisor identified two causes. First, the machine operator had to learn assembly skills on the job, so his assembly time was longer than the standard time per chair. Second, the materials handling people were partially

responsible because they delivered parts late on five different occasions. Management decided to keep a close eye on the materials handling function by tracking delivery times and number of delays for the next three months. Once the new data have been collected and analyzed, corrective action can be taken.

Manufacturing Overhead Variances

Controlling manufacturing overhead costs is more difficult than controlling direct materials and direct labor costs because the responsibility for manufacturing overhead costs is hard to assign. In addition, many types of both variable and fixed manufacturing overhead costs may contribute to variances from standard costs. Most fixed manufacturing overhead costs are not controlled by specific department managers because they are unavoidable past costs, such as depreciation and lease expenses. If variable manufacturing overhead costs can be related to departments or activities, however, some control is possible.

USING A FLEXIBLE BUDGET The type of budget a company uses strongly affects the accuracy of its manufacturing overhead variance analysis. The budgets discussed earlier were *static*, or fixed, budgets. They forecast revenues and expenses for one level of sales and production. The entire master budget is usually prepared for a single level of output, but many things can happen over a year's time that will cause actual output to differ from the estimated output. If a company produces more products than predicted, total production costs should also rise. In such a situation, comparing actual production costs with static budgeted amounts will automatically show large variances.

Exhibit 1 presents data for Bradford Industries, Inc. As you can see, actual costs exceed budgeted costs by \$14,300, or 7.2 percent. Most managers would consider

Exhibit 1

Performance Analysis: Comparison of Actual and Budgeted Data

Bradford Industries, Inc. Performance Report—Berwyn Division For the Year Ended December 31, 20x5

Cost Category	Budget*	Actual†	Difference Under (Over) Budget
Direct materials	\$ 42,000	\$ 46,000	(\$ 4,000)
Direct labor	68,250	75,000	(6,750)
Manufacturing overhead			
Variable			
Indirect materials	10,500	11,500	(1,000)
Indirect labor	14,000	15,250	(1,250)
Utilities	7,000	7,600	(600)
Other	8,750	9,750	(1,000)
Fixed			
Supervisory salaries	19,000	18,500	500
Depreciation	15,000	15,000	—
Utilities	4,500	4,500	—
Other	10,900	11,100	(200)
Totals	<u>\$199,900</u>	<u>\$214,200</u>	<u>(\$14,300)</u>

*Budget based on expected productive output of 17,500 units.

†Actual cost of producing 19,100 units.

Exhibit 2**Flexible Budget: Total Performance**

Bradford Industries, Inc.
Flexible Budget—Berwyn Division
For the Year Ended December 31, 20x5

Cost Category	Units Produced			Variable Cost per Unit*
	15,000	17,500	20,000	
Direct materials	\$ 36,000	\$ 42,000	\$ 48,000	\$2.40
Direct labor	58,500	68,250	78,000	3.90
Variable manufacturing overhead				
Indirect materials	9,000	10,500	12,000	.60
Indirect labor	12,000	14,000	16,000	.80
Utilities	6,000	7,000	8,000	.40
Other	7,500	8,750	10,000	.50
Total variable costs	<u>\$129,000</u>	<u>\$150,500</u>	<u>\$172,000</u>	<u>\$8.60</u>
Fixed manufacturing overhead				
Supervisory salaries	\$ 19,000	\$ 19,000	\$ 19,000	
Depreciation	15,000	15,000	15,000	
Utilities	4,500	4,500	4,500	
Other	10,900	10,900	10,900	
Total fixed manufacturing overhead costs	<u>\$ 49,400</u>	<u>\$ 49,400</u>	<u>\$ 49,400</u>	
Total costs	<u>\$178,400</u>	<u>\$199,900</u>	<u>\$221,400</u>	
Flexible budget formula:				
Total budgeted costs = (variable cost per unit × number of units produced) + budgeted fixed costs =				
(\$8.60 × units produced) + \$49,400				

Note: Activity expressed in units was used as the basis for this analysis. When units are used, direct material and direct labor costs are included in the analysis. Flexible budgets are commonly restricted to overhead costs. In such cases, machine hours or direct labor hours are used in place of units produced.

*Computed by dividing the dollar amount in any column by the respective level of activity.

such an overrun to be significant. But was there really a cost overrun? The budgeted amounts are based on an expected output of 17,500 units, but actual output was 19,100 units. Thus, the static budget for 17,500 units is inadequate for judging performance. Before analyzing the performance of the Berwyn Division, we must change the budgeted data to reflect an output of 19,100 units.

This can be accomplished by using a flexible budget. A **flexible budget** is a summary of expected costs for a *range* of activity levels, geared to changes in the level of productive output. Unlike a static budget, a flexible budget provides forecasted data that can be adjusted automatically for changes in the level of output. The flexible budget (also called a *variable budget*) is primarily a cost control tool used in evaluating performance.

Exhibit 2 presents a flexible budget for Bradford Industries, Inc., with budgeted data for 15,000, 17,500, and 20,000 units of output. The total cost of a variable cost item is found by multiplying the number of units produced by the variable cost for one unit of that item. For example, in the Berwyn Division, direct materials will cost \$36,000 if 15,000 units are produced (15,000 units × \$2.40). The

EXHIBIT 3**Performance Report Using
Flexible Budget Data****Bradford Industries, Inc.
Performance Report—Berwyn Division
For the Year Ended December 31, 20x5**

Cost Category (Variable Unit Cost)	Budget*	Actual Cost	Difference Under (Over) Budget
Direct materials (\$2.40)	\$ 45,840	\$ 46,000	(\$160)
Direct labor (\$3.90)	74,490	75,000	(510)
Manufacturing overhead			
Variable			
Indirect materials (\$.60)	11,460	11,500	(40)
Indirect labor (\$.80)	15,280	15,250	30
Utilities (\$.40)	7,640	7,600	40
Other (\$.50)	9,550	9,750	(200)
Fixed			
Supervisory salaries	19,000	18,500	500
Depreciation	15,000	15,000	—
Utilities	4,500	4,500	—
Other	10,900	11,100	(200)
Totals	<u>\$213,660</u>	<u>\$214,200</u>	<u>(\$540)</u>

*Budget based on actual production of 19,100 units.

important part of this illustration is the flexible budget formula shown at the bottom of Exhibit 2. The **flexible budget formula** is an equation that determines the expected budgeted cost for any level of productive activity. It consists of a per-unit amount for variable costs and a total amount for fixed costs. In Exhibit 2, the \$8.60 variable cost per unit is computed in the far right column, and the \$49,400 is found in the fixed cost section of the analysis. Using this formula, you can create a budget for the Berwyn Division at any level of output in the range of activity levels given.

Exhibit 3 shows a performance report prepared using the flexible budget data in Exhibit 2. Variable unit costs have been multiplied by 19,100 units to arrive at the total budgeted figures. Fixed overhead information has been carried over from the flexible budget developed in Exhibit 2. As the new performance report shows, costs exceeded budgeted amounts during the year by only \$540, or less than three-tenths of one percent. In other words, when we use a flexible budget, we find that the performance of the Berwyn Division is almost on target.

At the Bradford Company, a flexible budget is used to analyze overall performance. At the Ramos Company, a flexible budget is used only to analyze manufacturing overhead costs. Exhibit 4 shows the Ramos Company's flexible budget for manufacturing overhead costs for the Chair Assembly Department. Whereas Bradford Industries' flexible budget was based on units of output, the Ramos Company's budget uses direct labor hours as the expression of activity. Thus, in the Ramos budget, variable costs vary with the number of direct labor hours worked. Total fixed manufacturing overhead costs remain constant. The flexible budget formula in such cases is (variable costs per direct labor hour \times number of direct labor hours) + budgeted fixed manufacturing overhead costs. As shown at the bottom of Exhibit 4, the specific flexible budget formula for the Ramos Company is (\$5.75 \times number of DLH) + \$1,300.

EXHIBIT 4**Flexible Budget: Manufacturing Overhead Costs**

Ramos Company
Flexible Budget—Manufacturing Overhead
Chair Assembly Department
For an Average One-Month Period

Cost Category	Direct Labor Hours (DLH)			Variable Cost per DLH
	300	400	500	
Budgeted variable manufacturing overhead				
Indirect materials	\$ 450	\$ 600	\$ 750	\$1.50
Indirect labor	600	800	1,000	2.00
Supplies	225	300	375	.75
Utilities	300	400	500	1.00
Other	150	200	250	.50
Total budgeted variable manufacturing overhead costs	<u>\$1,725</u>	<u>\$2,300</u>	<u>\$2,875</u>	<u>\$5.75</u>
Budgeted fixed manufacturing overhead				
Supervisory salaries	\$ 600	\$ 600	\$ 600	
Depreciation	400	400	400	
Other	300	300	300	
Total budgeted fixed manufacturing overhead costs	<u>\$1,300</u>	<u>\$1,300</u>	<u>\$1,300</u>	
Total budgeted manufacturing overhead costs	<u>\$3,025</u>	<u>\$3,600</u>	<u>\$4,175</u>	

Flexible budget formula:

Total budgeted manufacturing overhead costs = (variable costs per direct labor hour × number of DLH) +
budgeted fixed manufacturing overhead costs = (\$5.75 × number of DLH) + \$1,300

The flexible budget in Exhibit 4 shows overhead costs for 300, 400, and 500 direct labor hours. However, this month Ramos Company did not operate at exactly one of those activity levels. Instead, it operated at 432 direct labor hours. To find the total budgeted manufacturing overhead costs for the month, simply insert 432 direct labor hours in the flexible budget formula: $(\$5.75 \times 432 \text{ DLH}) + \$1,300 = \$3,784$.

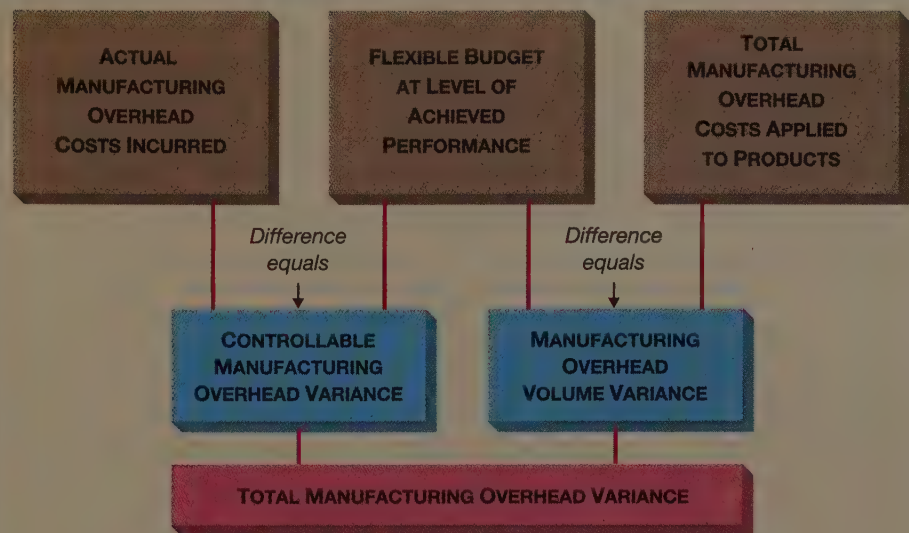
OBJECTIVE

7 Compute and analyze manufacturing overhead variances

ANALYZING MANUFACTURING OVERHEAD VARIANCES Analyses of manufacturing overhead variances differ in degree of detail. The basic approach is to compute the **total manufacturing overhead variance**, which is the difference between the actual manufacturing overhead costs incurred and the standard manufacturing overhead costs applied to production using the standard variable and fixed manufacturing overhead rates. The total manufacturing overhead variance is then divided into two parts: the controllable manufacturing overhead variance and the manufacturing overhead volume variance.

The analysis of overhead variances for the Ramos Company is shown in Figure 5. Ramos Company budgeted standard variable manufacturing overhead costs of \$5.75 per direct labor hour plus \$1,300 of fixed manufacturing overhead costs for the month of August (see the flexible budget formula in Exhibit 4). Normal capacity is 167 units. That level is based on the availability of 400 standard direct labor hours divided by 2.4 standard direct labor hours per unit (400 hours ÷ 2.4 hours

Figure 5
Manufacturing Overhead
Variance Analysis



Using Data from the Ramos Company Illustration:

Actual Manufacturing Overhead Costs Incurred	Flexible Budget at Level of Achieved Performance	Total Manufacturing Overhead Costs Applied to Products
(Given in example)	Variable rate times standard hours allowed*	Variable:
	$\$5.75 \times 432 \text{ hours} = \$2,484$	$\$5.75 \times 432 \text{ hours} = \$2,484$
	Plus budgeted fixed costs	Fixed:
	$1,300$	$\$3.25 \times 432 \text{ hours} = 1,404$
<u>\$4,100</u>	<u>\$3,784</u>	<u>\$3,888</u>
	Controllable Manufacturing Overhead Variance	Manufacturing Overhead Volume Variance
	<u>\$316 (U)</u>	<u>\$104 (F)</u>
	Total Manufacturing Overhead Variance = <u>\$212 (U)</u>	

* Standard hours allowed (achieved performance level) is computed by multiplying good units produced times required standard direct labor time per unit. The computation is as follows:

$$180 \text{ chairs produced} \times 2.4 \text{ hours per chair} = 432 \text{ standard hours allowed}$$

= 167 units). The company incurred \$4,100 of actual manufacturing overhead costs in August.

Before finding the manufacturing overhead variances, the total standard manufacturing overhead rate must be calculated. The total standard manufacturing overhead rate has two parts. One is the variable rate of \$5.75 per direct labor hour. The other is the standard fixed manufacturing overhead rate, which is found by dividing budgeted fixed manufacturing overhead (\$1,300) by normal capacity. The result is a fixed overhead rate of \$3.25 per direct labor hour ($\$1,300 \div 400 \text{ hours}$). So, the total standard manufacturing overhead rate is \$9.00 per direct labor hour ($\$5.75 + \3.25). The total budgeted fixed manufacturing overhead costs divided by normal capacity provides a rate that applies fixed manufacturing

overhead costs to products in a way that is consistent with expected output. The total manufacturing overhead variance is computed as follows:

Standard manufacturing overhead costs applied to good units produced	
\$9.00 per direct labor hour \times (180 chairs \times 2.4 hr. per chair)	\$3,888
Less actual manufacturing overhead costs incurred	<u>4,100</u>
Total manufacturing overhead variance	<u>\$ 212 (U)</u>

This amount can be divided into two parts: the controllable manufacturing overhead variance and the manufacturing overhead volume variance. The **controllable manufacturing overhead variance** is the difference between the actual manufacturing overhead costs incurred and the manufacturing overhead costs budgeted for the level of production reached. Thus, the controllable manufacturing overhead variance for Ramos Company for August is as follows:

Budgeted manufacturing overhead (flexible budget) for 180 chairs:	
Variable manufacturing overhead cost for 432 direct labor hours	
\$5.75 per direct labor hour \times (180 chairs \times 2.4 hr. per chair)	\$2,484
Budgeted fixed manufacturing overhead cost	<u>1,300</u>
Total budgeted manufacturing overhead	\$3,784
Less actual manufacturing overhead costs incurred	<u>4,100</u>
Controllable manufacturing overhead variance	<u>\$ 316 (U)</u>

In this example, the controllable manufacturing overhead variance is unfavorable; the company spent more than had been budgeted.

The **manufacturing overhead volume variance** is the difference between the manufacturing overhead costs budgeted for the level of production achieved and the manufacturing overhead costs applied to production using the standard variable and fixed manufacturing overhead rates. Continuing with the Ramos Company example, we have the following:

Standard manufacturing overhead applied for 432 direct labor hours	
\$9.00 per direct labor hour \times (180 chairs \times 2.4 hr. per chair)	\$3,888
Less total budgeted manufacturing overhead (see above)	<u>3,784</u>
Manufacturing overhead volume variance	<u>\$ 104 (F)</u>

The variance is favorable because the fixed costs are spread over more units (180 chairs as opposed to normal capacity of 167 chairs), resulting in a lower fixed cost per unit.

Checking the computations, we find that the two variances do equal the total manufacturing overhead variance.

Controllable manufacturing overhead variance	\$ 316 (U)
Manufacturing overhead volume variance	<u>104 (F)</u>
Total manufacturing overhead variance	<u>\$212 (U)</u>

Because the manufacturing overhead volume variance measures the use of existing facilities and capacity, a volume variance will occur if more or less capacity than normal is used. In this example, 400 direct labor hours is considered normal use of facilities. Fixed manufacturing overhead costs are applied on the basis of

standard hours allowed. So in the example, manufacturing overhead was applied on the basis of 432 hours, even though the fixed manufacturing overhead rate was computed using 400 hours (normal capacity). Thus, more fixed costs would be applied to products than were budgeted. Because the products can absorb no more than the actual costs incurred, this level of production would tend to lower unit cost. Thus, when capacity exceeds the expected amount, the result is a favorable manufacturing overhead volume variance. When capacity does not meet the normal level, not all of the fixed manufacturing overhead costs will be applied to units produced. It is then necessary to add the amount of underapplied fixed manufacturing overhead to the cost of the good units produced, thereby increasing their unit cost. This condition is unfavorable.

Figure 5 summarizes the analysis of manufacturing overhead variance. As explained earlier, to determine the controllable manufacturing overhead variance, the budgeted manufacturing overhead amount (using a flexible budget for the level of output achieved) is subtracted from the actual manufacturing overhead costs incurred. A positive result means an unfavorable variance because actual costs were greater than budgeted costs. The controllable manufacturing overhead variance is favorable if the difference is negative. Subtracting total manufacturing overhead applied from budgeted manufacturing overhead at the level of output achieved yields the manufacturing overhead volume variance. Again, a positive result means an unfavorable variance; a negative result, a favorable variance. The data from the Ramos Company example are shown in the lower part of Figure 5. Carefully check the solution in the figure with that computed previously.

TAKING CORRECTIVE ACTION—RAMOS COMPANY

The manager of Ramos Company's Chair Assembly Department found that the unfavorable controllable variance of \$316 was caused by higher than anticipated usage of indirect materials and the inefficient assembly skills of the borrowed machine operator. To obtain more specific information, the manager asked the management accountant to study the use of indirect materials over a period of three months.

The borrowed machine operator took 450 hours to do 432 standard hours of work, but the 432 standard hours were well above the normal capacity of 400 direct labor hours. The overutilization of capacity resulted in a favorable volume variance of \$104. The cause was traced to high seasonal demand for the product that pressed the company to use almost all of its capacity. Management decided not to do anything about the volume variance because it fell within a range that had been anticipated.

An unfavorable volume variance would result if the company operated at a level below the normal capacity in units. In some cases, a negative volume variance would be in the best interest of the company. For example, in a period of slow

FOCUS ON BUSINESS PRACTICE

Standard costs may be used with activity-based costing (ABC). However, the use of ABC changes the analysis of overhead variance in one very significant way. Instead of using a single measure of capacity, such as direct labor hours or machine hours, to analyze overhead, ABC uses

a different measure of capacity for each activity. This is necessary because under ABC, each activity has a different cost driver. For example, companies that use ABC, such as Ingersoll Milling Machine Co. and Saturn



Automobile Co., will trace costs to individual activities within departments rather than accumulate them for whole departments. Setup activities, work cell activities, and maintenance activities will each have a different cost driver and a separate analysis of controllable and volume variances.

sales, the generation of a negative volume variance would mean the company was not building up excessive inventory that might be subject to obsolescence, weathering, and storage costs. It is for this reason that the achievement of a positive volume variance does not always indicate that a manager has performed well.

Using Variances in Performance Evaluation

OBJECTIVE

8 Explain how variances are used to evaluate managers' performance

The effective evaluation of managers' performance depends on both human factors and company policies. Using variances from standard costs in a manager's performance report adds accuracy to the evaluation process.

The human factor is the key to meeting corporate goals. People do the planning, people perform the operating processes, and people evaluate and are evaluated. To ensure effectiveness and fairness when setting up a performance evaluation process, management should develop appropriate policies and get direct input from managers and employees. More specifically, a company's management should establish policies and procedures for (1) preparing operational plans, (2) assigning responsibility for performance, (3) communicating operational plans to key personnel, (4) evaluating each area of responsibility, (5) identifying the causes of significant variances, and (6) taking corrective action to eliminate problems.

Variance analysis tends to pinpoint efficient and inefficient operating areas better than do basic comparisons of actual and budgeted data. Breaking down cost differences into more detailed variances helps to identify the causes of those differences. The key to preparing a performance report based on standard costs and related variances is to follow company policy by (1) identifying the personnel responsible for each significant variance, (2) determining the causes of each variance, and (3) developing a reporting format suited to the task. Performance reports should be tailored to each manager's responsibilities. They should be clear and accurate and should explain in detail in what way the department or activity met or did not meet operating expectations. Managers should be held accountable for only those cost areas under their control.

Exhibit 5 shows a performance report for the manager of Ramos Company's Chair Assembly Department. The report summarizes all the cost data and variances for direct materials, direct labor, and manufacturing overhead. In addition, it identifies the causes of all the variances and the corrective actions taken. This report enables the plant superintendent to review the manager's actions and evaluate his or her performance. A point to remember is that the mere occurrence of a variance does not indicate poor performance. However, if a variance consistently

FOCUS ON BUSINESS TECHNOLOGY

"You can't manage what you can't measure." To control the operations of an organization, managers must continuously monitor operating conditions. Traditional accounting techniques provided some help to managers, but the preparation of operating reports often took several days,

or even several weeks. By the time a manager got the necessary information, in many cases, the problems had recurred or even gotten worse.

Modern technology has led to the creation of Continuous Control Monitoring (CCM). CCM is a management accounting practice that provides managers with continuous, current measurements of operations. Computer analyses identify variances from standards almost instantaneously so that managers can quickly take corrective action.⁴

Exhibit 5
Managerial Performance Report
Using Variance Analysis

Ramos Company
Managerial Performance Report
Chair Assembly Department
For the Month Ended August 31, 20x2

Productivity Summary

Normal capacity (direct labor hours, or DLH)	400 DLH
Capacity performance level achieved (standard hours allowed)	432 DLH
Good units produced (normal capacity = 167 units)	180 chairs

Cost and Variance Analysis

	Standard Cost	Actual Cost Incurred	Total Variance	Variance Breakdown	
				Amount	Type
Direct materials	\$ 4,320	\$ 4,484	\$164 (U)	\$ 76 (F)	Direct materials price variance
				240 (U)	Direct materials quantity variance
Direct labor	3,672	4,140	468 (U)	315 (U)	Direct labor rate variance
				153 (U)	Direct labor efficiency variance
Manufacturing overhead	3,888	4,100	212 (U)	316 (U)	Controllable manufacturing overhead variance
				104 (F)	Manufacturing overhead volume variance
Totals	<u>\$11,880</u>	<u>\$12,724</u>	<u>\$844 (U)</u>	<u>\$844 (U)</u>	

Causes of Variances

Direct materials price variance:

Substitute direct material purchased at reduced price

Direct materials quantity variance:

Poor quality of substitute direct material

Direct labor rate variance:

Machine operator replaced assembly worker

Direct labor efficiency variance:

Machine operator replaced assembly worker

Late delivery of parts to assembly floor

Controllable manufacturing overhead variance:

Indirect materials usage too high—caused by replacement worker's lack of skill

Manufacturing overhead volume variance:

High number of product orders caused by seasonal demand

Actions Taken

Substitute direct material not appropriate—returned to original direct material

Substitute direct material not appropriate—returned to original direct material

Temporary replacement—assembly worker ill

Temporary replacement—assembly worker ill
 Material delivery times and number of delays being tracked

Study of indirect materials usage being conducted

No action necessary

occurs, no cause is identified, and no corrective action is taken, the manager may be suspected of poor performance. The report in Exhibit 5 suggests that the manager of the Chair Assembly Department has the operation under control because the causes of the variances have been identified and corrective actions have been taken.

Chapter Review

REVIEW OF LEARNING OBJECTIVES



Check out ACE, a self-quizzing program on chapter content, at <http://college.hmco.com>.

1. **Define *standard costs* and describe how managers use standard costs in the management cycle.** Standard costs are realistically predetermined costs that are developed from analyses of both past and projected future costs and operating conditions. In a standard costing system, standard costs for direct materials, direct labor, and manufacturing overhead flow through the inventory accounts and eventually into the Cost of Goods Sold account. Instead of using actual costs for product costing, standard costs are used.

Once standard costs have been developed, managers use them as tools for planning and budgeting. Once the projected sales and production unit targets for the upcoming year are established, standard costs can be used to compute planned costs for direct materials, direct labor, and variable manufacturing overhead. The resulting costs serve as targets, or goals, for product costing. They can also be used in product distribution and pricing. At the end of an accounting period, actual costs incurred are compared with standard costs and the differences are computed. Those differences, called variances, provide measures of performance that can be used to control costs.

Standard costs are useful for preparing operating budgets and evaluating performance. They help in identifying production costs that require control, in establishing realistic prices, and in simplifying procedures for valuing inventories and product costing.

2. **Identify the six elements of, and compute, a standard unit cost.** The six elements of a standard unit cost are (1) the direct materials price standard, (2) the direct materials quantity standard, (3) the direct labor time standard, (4) the direct labor rate standard, (5) the standard variable manufacturing overhead rate, and (6) the standard fixed manufacturing overhead rate. The direct materials price standard is found by carefully considering expected price increases, changes in available quantities, and possible new sources of supply. The direct materials quantity standard expresses the expected quantity to be used. It is affected by product engineering specifications, the quality of direct materials, the age and productivity of the machines, and the quality and experience of the work force. The direct labor time standard is based on current time and motion studies of workers and machines and on past employee and machine performance. Labor union contracts and company personnel policies influence direct labor rate standards. Standard variable and fixed manufacturing overhead rates are found by dividing total budgeted variable and fixed manufacturing overhead costs by an appropriate application base.

A product's total standard unit cost is computed by adding the following costs: (1) direct materials cost (equals direct materials price standard times direct materials quantity standard), (2) direct labor cost (equals direct labor rate standard times direct labor time standard) and (3) manufacturing overhead cost (equals standard variable and standard fixed manufacturing overhead rate times standard direct labor hours allowed per unit).

3. **Describe how to control costs through variance analysis.** A standard costing system has traditionally been associated with cost control activities and the evaluation of operating performance. Managers of manufacturing operations, as well as those responsible for selling and service functions, constantly compare the costs of what was expected to occur with the costs of what actually occurred. By examining the differences—or variances—between standard and actual costs, managers can learn much valuable information. Variance analysis is a four-step approach. The first step is to compute the variance. If the

variance is insignificant, actual operating results are close to or equal to anticipated operating conditions, and no corrective action is needed. In the second step, if the variance is significant, the management accountant analyzes it to identify its cause. Knowing the cause of a problem or variance usually helps the accountant pinpoint the areas or activities that need to be monitored. The third step involves identifying the performance measures that track the activities in question. The final step is to make the changes needed to correct the problem.

- 4. Compute and analyze direct materials variances.** An analysis of the direct materials price and quantity variances helps to explain the causes of differences between standard and actual direct materials costs. The direct materials price variance is computed by finding the difference between the standard price and the actual price per unit and multiplying it by the actual quantity purchased. The direct materials quantity variance is the difference between the standard quantity that should have been used and the actual quantity used, multiplied by the standard price.
- 5. Compute and analyze direct labor variances.** Causes for the difference between standard direct labor costs and actual direct labor costs are identified by analyzing the direct labor rate and direct labor efficiency variances. The direct labor rate variance is computed by determining the difference between the standard labor rate and the actual labor rate and multiplying it by the actual labor hours worked. The direct labor efficiency variance is equal to the difference between the standard hours allowed for the number of good units produced and the actual hours worked, multiplied by the standard direct labor rate for the operation being analyzed.
- 6. Define and prepare a flexible budget.** A flexible budget is a summary of anticipated costs for a range of activity levels, geared to changes in productive output. Variable, fixed, and total costs are given for several levels of capacity or output. From those data, the management accountant derives the flexible budget formula. That formula, which can be applied to any level of productive output, allows management to evaluate the performance of individuals, departments, or processes.
- 7. Compute and analyze manufacturing overhead variances.** The total manufacturing overhead variance is equal to the amount of under- or overapplied manufacturing overhead costs for the period. An analysis of the controllable manufacturing overhead variance and the manufacturing overhead volume variance will help to explain why the amount of manufacturing overhead applied to units produced differed from the manufacturing overhead costs incurred. The controllable manufacturing overhead variance is the difference between the actual manufacturing overhead costs incurred and the manufacturing overhead costs budgeted for the level of production achieved (based on the flexible budget). The manufacturing overhead volume variance is the difference between the manufacturing overhead budgeted for the level of production achieved and the total manufacturing overhead costs applied to production using the standard variable and fixed manufacturing overhead rates.
- 8. Explain how variances are used to evaluate managers' performance.** The effective evaluation of managers' performance depends on both human factors and company policies. Using variances from standard costs in a manager's performance report adds accuracy to the evaluation process. To ensure effectiveness and fairness when setting up a performance evaluation process, management should develop appropriate policies and get direct input from managers and employees. More specifically, management should establish policies and procedures for (1) preparing operational plans, (2) assigning responsibility

for performance, (3) communicating operational plans to key personnel, (4) evaluating each area of responsibility, (5) identifying the causes of significant variances, and (6) taking corrective action to eliminate problems.

The key to preparing a performance report based on standard costs and related variances is to follow company policy by (1) identifying the personnel responsible for each variance, (2) determining the causes for each variance, and (3) developing a reporting format suited to the task. Performance reports should be tailored to each manager's responsibilities.

REVIEW OF CONCEPTS AND TERMINOLOGY

The following concepts and terms were introduced in this chapter:

- L0 7 Controllable manufacturing overhead variance:** The difference between the actual manufacturing overhead costs incurred and the manufacturing overhead costs budgeted for the level of production reached.
- L0 5 Direct labor efficiency variance:** The difference between the standard direct labor hours allowed for the good units produced and the actual direct labor hours worked, multiplied by the standard direct labor rate.
- L0 2 Direct labor rate standards:** The hourly direct labor costs that are expected to prevail during the next accounting period for each function or job classification.
- L0 5 Direct labor rate variance:** The difference between the standard direct labor rate and the actual direct labor rate, multiplied by the actual direct labor hours worked.
- L0 2 Direct labor time standard:** The expected time required for each department, machine, or process to complete the production of one unit or one batch of output.
- L0 2 Direct materials price standard:** A careful estimate of the cost of a specific direct material in the next accounting period.
- L0 4 Direct materials price variance:** The difference between the standard price and the actual price, multiplied by the actual quantity purchased.
- L0 2 Direct materials quantity standard:** An estimate of the amount of direct materials expected to be used, influenced by product engineering specifications, the quality of direct materials, the age and productivity of machinery, and the quality and experience of the work force.
- L0 4 Direct materials quantity variance:** The difference between the standard quantity and the actual quantity used, multiplied by the standard price.
- L0 6 Flexible budget:** A summary of expected costs for a range of activity levels, geared to changes in the level of productive output; also called *variable budget*.
- L0 6 Flexible budget formula:** An equation that determines the expected budgeted cost for any level of productive output.
- L0 7 Manufacturing overhead volume variance:** The difference between the manufacturing overhead costs budgeted for the level of production achieved and the manufacturing overhead costs applied to production using the standard variable and fixed manufacturing overhead rates.
- L0 1 Standard costing:** A budgetary control technique with three components: a standard, or predetermined, performance level; a measure of actual performance; and a measure of the difference, or variance, between the standard and the actual performances.
- L0 1 Standard costs:** Realistically predetermined costs that are developed from analyses of both past and projected future costs and operating conditions.
- L0 2 Standard direct labor cost:** The standard wage for direct labor multiplied by the standard hours of direct labor.
- L0 2 Standard direct materials cost:** The standard price for direct materials multiplied by the standard quantity for direct materials.

- L0 2 Standard fixed manufacturing overhead rate:** Total budgeted fixed manufacturing overhead costs divided by an expression of capacity, usually normal capacity in terms of standard hours or units.
- L0 2 Standard manufacturing overhead cost:** The sum of the estimates for variable and fixed manufacturing overhead costs in the next accounting period.
- L0 2 Standard variable manufacturing overhead rate:** Total budgeted variable manufacturing overhead costs divided by an expression of capacity, such as the expected number of standard machine hours or standard direct labor hours.
- L0 5 Total direct labor cost variance:** The difference between the standard direct labor cost for the good units produced and the actual direct labor costs incurred.
- L0 4 Total direct materials cost variance:** The difference between the standard cost of direct materials and the actual cost incurred for those items.
- L0 7 Total manufacturing overhead variance:** The difference between the actual manufacturing overhead costs incurred and the standard manufacturing overhead costs applied to production using the standard variable and fixed manufacturing overhead rates.
- L0 1 Variance:** The difference between a standard cost and an actual cost.
- L0 3 Variance analysis:** The process of computing the differences between standard (or budgeted) costs and actual costs and identifying the causes of those differences.

REVIEW PROBLEM

Variance Analysis

- L0 2** Sosnow Manufacturing Company has a standard costing system and keeps all cost standards up to date. The company's main product is copper water pipe, which is made in a single department. The standard variable costs for one unit of finished pipe are:

L0 6	Direct materials (3 sq. meters @ \$12.50 per sq. meter)	\$37.50
L0 7	Direct labor (1.2 hours @ \$9.00 per hour)	10.80
	Variable manufacturing overhead (1.2 hours @ \$5.00 per direct labor hour)	6.00
	Standard variable cost per unit	<u>\$54.30</u>

Normal capacity is 15,000 direct labor hours, and budgeted fixed manufacturing overhead costs for the year were \$54,000. During the year, the company produced and sold 12,200 units. Related transactions and actual cost data for the year were as follows: Direct materials consisted of 37,500 square meters purchased and used; unit purchase cost was \$12.40 per square meter. Direct labor consisted of 15,250 direct labor hours worked at an average labor rate of \$9.20 per hour. Actual manufacturing overhead costs incurred for the period consisted of variable manufacturing overhead costs of \$73,200 and fixed manufacturing overhead costs of \$55,000.

REQUIRED

Using the data given, compute the following:

- Standard hours allowed
- Standard fixed manufacturing overhead rate
- Direct materials price variance
- Direct materials quantity variance
- Direct labor rate variance
- Direct labor efficiency variance
- Controllable manufacturing overhead variance
- Manufacturing overhead volume variance

ANSWER TO REVIEW PROBLEM

- Standard Hours Allowed = Good Units Produced × Standard Direct Labor Hours per Unit

$$= 12,200 \text{ units} \times 1.2 \text{ direct labor hours per unit} = \underline{\underline{14,640 \text{ hours}}}$$

$$\begin{aligned}
 2. \text{ Standard Fixed Manufacturing Overhead Rate} &= \frac{\text{Budgeted Fixed Manufacturing Overhead Cost}}{\text{Normal Capacity}} \\
 &= \frac{\$54,000}{15,000 \text{ direct labor hours}} \\
 &= \underline{\underline{\$3.60 \text{ per direct labor hour}}}
 \end{aligned}$$

3. Direct materials price variance:

Price difference:	Standard price	\$12.50 per sq. meter
	Less actual price	<u>12.40 per sq. meter</u>
	Difference	<u>\$.10 (F)</u>

$$\begin{aligned}
 \text{Direct Materials Price Variance} &= (\text{Standard Price} - \text{Actual Price}) \times \text{Actual Quantity} \\
 &= \$.10 (\text{F}) \times 37,500 \text{ sq. meters} \\
 &= \underline{\underline{\$3,750 (\text{F})}}
 \end{aligned}$$

4. Direct materials quantity variance:

Quantity difference:	Standard quantity	
	(12,200 units \times 3 sq. meters)	36,600 sq. meters
	Less actual quantity	<u>37,500 sq. meters</u>
	Difference	<u>900 (U)</u>

$$\begin{aligned}
 \text{Direct Materials Quantity Variance} &= \text{Standard Price} \times (\text{Standard Quantity} - \text{Actual Quantity}) \\
 &= \$12.50 \text{ per sq. meter} \times 900 \text{ sq. meters (U)} \\
 &= \underline{\underline{\$11,250 (\text{U})}}
 \end{aligned}$$

5. Direct labor rate variance:

Rate difference:	Standard labor rate	\$9.00 per hour
	Less actual labor rate	<u>9.20 per hour</u>
	Difference	<u>\$.20 (U)</u>

$$\begin{aligned}
 \text{Direct Labor Rate Variance} &= (\text{Standard Rate} - \text{Actual Rate}) \times \text{Actual Hours} \\
 &= \$.20 (\text{U}) \times 15,250 \text{ hours} \\
 &= \underline{\underline{\$3,050 (\text{U})}}
 \end{aligned}$$

6. Direct labor efficiency variance:

Difference in hours:	Standard hours allowed	14,640 hours*
	Less actual hours	<u>15,250 hours</u>
	Difference	<u>610 (U)</u>

$$\begin{aligned}
 \text{Direct Labor Efficiency Variance} &= \text{Standard Rate} \times (\text{Standard Hours Allowed} - \text{Actual Hours}) \\
 &= \$9.00 \text{ per hour} \times 610 \text{ hours (U)} \\
 &= \underline{\underline{\$5,490 (\text{U})}}
 \end{aligned}$$

*12,200 units produced \times 1.2 hours per unit = 14,640 hours.

7. Controllable manufacturing overhead variance:

Budgeted manufacturing overhead for 14,640 hours		
Variable manufacturing overhead cost		
(14,640 labor hours \times \$5.00 per hour)	\$73,200	
Budgeted fixed manufacturing overhead cost	<u>54,000</u>	
Total budgeted manufacturing overhead		\$127,200
Less actual manufacturing overhead costs incurred		<u>128,200</u>
Controllable manufacturing overhead variance		<u>\$ 1,000 (U)</u>

8. Manufacturing overhead volume variance:

Standard manufacturing overhead applied	
Variable: 14,640 labor hours × \$5.00 per hour	\$73,200
Fixed: 14,640 labor hours × \$3.60 per hour	<u>52,704</u>
Total manufacturing overhead applied	\$125,904
Less total budgeted manufacturing overhead	<u>127,200</u>
(See computation in 7)	
Manufacturing overhead volume variance	<u>\$ 1,296 (U)</u>

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. What are standard costs?
2. What is a variance?
3. Can standard costing be used by a service organization? Explain your answer.
4. "Standard costing is a total unit cost concept in that standard unit costs are determined for direct materials, direct labor, and manufacturing overhead." Explain this statement.
5. What general ledger accounts are affected by a standard costing system?
6. What do predetermined overhead costing and standard costing have in common? How are they different?
7. Name the six elements used to compute a standard unit cost.
8. Identify three factors that could affect a direct materials price standard.
9. "Performance is evaluated by comparing what did happen with what should have happened." What is meant by this statement? Relate your comments to the budgetary control process.
10. What is variance analysis?
11. How can variances help management control operations?
12. What is the formula for computing a direct materials price variance?
13. How would you interpret an unfavorable direct materials price variance?
14. Can an unfavorable direct materials quantity variance be caused, at least in part, by a favorable direct materials price variance? Explain.
15. Identify two possible causes of a direct labor rate variance and describe the measures used to track performance in those areas. Then do the same for a direct labor efficiency variance.
16. What is a flexible budget? What is its purpose?
17. What are the two parts of the flexible budget formula? How are they related to each other?
18. Distinguish between the controllable manufacturing overhead variance and the manufacturing overhead volume variance.
19. If standard hours allowed exceed normal hours, will the period's manufacturing overhead volume variance be favorable or unfavorable? Explain your answer.
20. What is the key to preparing a performance report based on standard costs and related variances?

SHORT EXERCISES

- SE 1.** Jensen Corporation is considering the installation of a standard costing system. Dan Barkus, the manager of the Missouri Division, attended the corporate meeting at which Leah Eisen, the controller, discussed the proposal. Barkus asked, "Leah, how will this

new system benefit me? How will I use the new system?" Prepare Eisen's response to Barkus.

- LO 1 Purposes of Standard Costs** **SE 2.** You are a consultant and a client asks you why companies include standard costs in their cost accounting systems. Prepare your response, listing several purposes for introducing standard costs into a cost accounting system.
- LO 2 Standard Unit Cost Computation** **SE 3.** Given the following information, compute the standard unit cost of Product JLT.
- | | |
|--|--------------------------|
| Direct materials quantity standard: | 5 pounds per unit |
| Direct materials price standard: | \$10.20 per pound |
| Direct labor time standard: | .4 hour per unit |
| Direct labor rate standard: | \$10.75 per hour |
| Variable manufacturing overhead rate standard: | \$7.00 per machine hour |
| Fixed manufacturing overhead rate standard: | \$11.00 per machine hour |
| Machine hour standard: | 2 hours per unit |
- LO 3 Cost Variance Analysis** **SE 4.** Des Jardins Metal Works produces lawn sculptures. The company follows a practice of analyzing only variances that differ by more than 5 percent from the standard cost. The controller computed the following direct labor efficiency variances for March.
- | | Direct Labor
Efficiency Variance | Standard Direct
Labor Cost |
|------------|-------------------------------------|-------------------------------|
| Product 4 | \$1,240 (U) | \$26,200 |
| Product 6 | 3,290 (F) | 41,700 |
| Product 7 | 2,030 (U) | 34,300 |
| Product 9 | 1,620 (F) | 32,560 |
| Product 12 | 2,810 (U) | 59,740 |
- Identify the variances that should be analyzed for cause by determining the percentage of each variance (round to two decimal places). Also identify possible causes of the variances.
- LO 4 Direct Materials Variances** **SE 5.** Given the standard costs in SE 3 and the following actual cost and usage data, compute the direct materials price and direct materials quantity variances.
- | | |
|-------------------------------------|-------------------|
| Direct materials purchased and used | 55,000 pounds |
| Price paid for direct materials | \$10.00 per pound |
| Number of good units produced | 11,000 units |
- LO 5 Direct Labor Variances** **SE 6.** Given the standard costs in SE 3 and the following actual cost and usage data, compute the direct labor rate and direct labor efficiency variances.
- | | |
|-------------------------------|--------------|
| Direct labor hours used | 4,950 hours |
| Total cost of direct labor | \$53,460 |
| Number of good units produced | 11,000 units |
- LO 6 Flexible Budget Preparation** **SE 7.** Prepare a flexible budget for 10,000, 12,000, and 14,000 units of output, given the following information.
- | | |
|---|-----------------|
| Variable costs | |
| Direct materials | \$8.00 per unit |
| Direct labor | \$2.50 per unit |
| Variable manufacturing overhead | \$6.00 per unit |
| Total budgeted fixed manufacturing overhead | \$81,200 |
- LO 7 Manufacturing Overhead Variances** **SE 8.** Ron-Mar Products uses a standard costing system. The following information about manufacturing overhead was generated during August:
- | | |
|---|----------------------|
| Standard variable manufacturing overhead rate | \$2 per machine hour |
| Standard fixed manufacturing overhead rate | \$3 per machine hour |
| Actual variable manufacturing overhead costs | \$443,200 |
| Actual fixed manufacturing overhead costs | \$698,800 |
| Budgeted fixed manufacturing overhead costs | \$700,000 |
| Standard machine hours per unit | 12 |
| Good units produced | 18,940 |
| Actual machine hours | 228,400 |

Compute the controllable manufacturing overhead variance and the manufacturing overhead volume variance.

- SE 9.** Derrick Shirley, the production manager at AWA Industries, received a report containing the following information from Gina Masamoto, the company controller.

LO 8 Evaluating Managerial Performance

	Actual	Standard	Variance
Direct materials	\$38,200	\$36,600	\$1,600 (U)
Direct labor	19,450	19,000	450 (U)
Manufacturing overhead	62,890	60,000	2,890 (U)

Masamoto asked for a response. If you were Shirley, what would you do? What additional information does Shirley need to prepare his response?

EXERCISES

LO 1 Uses of Standard Costs

- E 1.** Roz Mandu has just assumed the duties of controller for Elan Market Research Company. She is concerned that the methods used for cost planning and control do not accurately track the operations of the business. She plans to suggest to the company's president, Tyson Elan, that a standard costing system be created for budgeting and cost control. The new system could be incorporated into the existing accounting system. The anticipated cost of installing the new costing system and training managers is around \$7,500. Prepare a memo from Roz Mandu to Tyson Elan that defines a standard costing system and outlines its uses and benefits.

LO 2 Development of Standard Costs

- E 2.** Bradley Corp. maintains a complete standard costing system and is in the process of updating its direct materials and direct labor standards for Product 20B. The following data have been accumulated.

Direct Materials

In the previous period, 20,500 units were produced and 32,800 square yards of direct materials at a cost of \$122,344 were used to produce them.

Direct Labor

During the previous period, 57,400 direct labor hours were worked, 34,850 hours on machine H and 22,550 hours on machine K.

Machine H operators earned \$9.40 per hour and machine K operators earned \$9.20 per hour last period. The new labor contract calls for a 10 percent increase in labor rates for the coming period.

Using the preceding information as the basis for the new standards, compute the direct materials quantity and price standards and the direct labor time and rate standards for each machine listed for the coming accounting period.

LO 2 Standard Unit Cost Computation

- E 3.** Hall Aerodynamics, Inc., makes electronically equipped weather-detecting balloons for university meteorology departments. Recent nationwide inflation has caused the company management to order that standard costs be recomputed. New direct materials price standards are \$600.00 per set for electronic components and \$13.50 per square meter for heavy-duty canvas. Direct materials quantity standards include one set of electronic components and 100 square meters of heavy-duty canvas per balloon. Direct labor time standards are 26 hours per balloon for the Electronics Department and 19 hours per balloon for the Assembly Department. Direct labor rate standards are \$11.00 per hour for the Electronics Department and \$10.00 per hour for the Assembly Department. Standard manufacturing overhead rates are \$16.00 per direct labor hour for the standard variable manufacturing overhead rate and \$12.00 per direct labor hour for the standard fixed manufacturing overhead rate.

Using the production standards provided, compute the standard unit cost of one weather balloon.

LO 4 Direct Materials Price and Quantity Variances

- E 4.** The Rabb Elevator Company manufactures small hydroelectric elevators with a maximum capacity of ten passengers. One of the direct materials used by the Production Department is heavy-duty carpeting for the floor of the elevator. The direct materials

quantity standard used for the month ended April 30, 20x8, was 8 square yards per elevator. During April, the purchasing agent purchased this carpeting at \$11 per square yard; the standard price for the period was \$12. Ninety elevators were completed and sold during April; the Production Department used an average of 8.5 square yards of carpet per elevator.

Calculate Rabb Elevator Company's direct materials price and quantity variances for carpet for April 20x8.

LO 5 Direct Labor Rate and Efficiency Variances

- E 5.** Byer Foundry, Inc., manufactures castings used by other companies in the production of machinery. For the past two years, the largest selling product has been a casting for an eight-cylinder engine block. Standard direct labor hours per engine block are 1.8 hours. The labor contract requires that \$14 per hour be paid to all direct labor employees. During June, 16,500 engine blocks were produced. Actual direct labor hours and costs for June were 29,900 hours and \$433,550, respectively.

1. Compute the direct labor rate variance for eight-cylinder engine blocks during June.
2. Using the same data, compute the direct labor efficiency variance for eight-cylinder engine blocks during June. Check your answer, assuming that the total direct labor variance is \$17,750 (U).

LO 6 Flexible Budget Preparation

- E 6.** Fixed manufacturing overhead costs for the Helms Company for 20x5 are expected to be as follows: depreciation, \$72,000; supervisory salaries, \$92,000; property taxes and insurance, \$26,000; and other fixed manufacturing overhead, \$14,500. Total fixed manufacturing overhead is thus expected to be \$204,500. Variable costs per unit are expected to be as follows: direct materials, \$16.50; direct labor, \$8.50; operating supplies, \$2.60; indirect labor, \$4.10; and other variable manufacturing overhead costs, \$3.20.

Prepare a flexible budget for the following levels of production: 18,000 units, 20,000 units, and 22,000 units. What is the flexible budget formula for 20x5?

LO 7 Manufacturing Overhead Variances

- E 7.** O'Connor Company produces handmade clamming buckets that are sold to distributors along the Atlantic coast of North Carolina. The company incurred \$12,400 of actual manufacturing overhead costs in May. Budgeted standard manufacturing overhead costs for May were \$4 of variable manufacturing overhead costs per direct labor hour plus \$1,500 in fixed manufacturing overhead costs. Normal capacity was set at 2,000 direct labor hours per month. In May, the company was able to produce 10,100 clamming buckets. The time standard is .2 direct labor hour per clamming bucket.

Compute the total manufacturing overhead variance, the controllable manufacturing overhead variance, and the manufacturing overhead volume variance for May.

LO 7 Manufacturing Overhead Variances

- E 8.** Brock Industries uses a standard costing system that includes flexible budgeting for cost planning and control. The 20x3 monthly flexible budget for manufacturing overhead costs is \$200,000 of fixed costs plus \$5.20 per machine hour. Monthly normal capacity of 100,000 machine hours is used to compute the standard fixed manufacturing overhead rate. During December 20x3, plant workers recorded 105,000 actual machine hours. The standard machine hours allowed for good production during December was only 98,500. Actual manufacturing overhead costs incurred during December totaled \$441,000 of variable costs and \$204,500 of fixed costs.

Compute (1) the under- or overapplied manufacturing overhead during December and (2) the controllable manufacturing overhead variance and the manufacturing overhead volume variance.

LO 8 Evaluating Managerial Performance

- E 9.** Jim La Plante is a project manager for Rochette Construction Company. Recently the company's controller sent him a performance report for the Bogs Apartment Complex project. Included in the report was an unfavorable direct labor efficiency variance of \$1,900 for roof structure. What types of information does La Plante need to analyze before he can respond to the unfavorable direct labor efficiency variance that is his responsibility?

PROBLEMS

LO 2 Developing and Using Standard Costs



- P 1.** Prefabricated houses are the specialty of Saltair Homes, Inc., of Corpus Christi, Texas. Although Saltair Homes produces many models, and customers can even special order a home, 60 percent of the company's business comes from the sale of the Citadel, a three-bedroom, 1,400-square-foot home with an impressive front entrance. The six basic direct materials used to manufacture the entrance with their standard costs for 20x1 are as follows: wood framing materials, \$2,140; deluxe front door, \$480; door hardware, \$260; exterior siding, \$710; electrical materials, \$580; and interior finishing materials, \$1,520.

Three types of direct labor are used to build this section: carpenter, 30 hours at \$12 per hour; door specialist, 4 hours at \$14 per hour; and electrician, 8 hours at \$16 per hour. In 20x1, the company used a manufacturing overhead rate of 40 percent of total direct materials cost.

During 20x2, the cost of wood framing materials is expected to increase by 20 percent. The deluxe front door will cost \$496 per door. The cost of the door hardware will increase by 10 percent, and the cost of electrical materials will increase by 20 percent. Exterior siding cost should decrease by \$16 per unit. The cost of interior finishing materials is expected to remain the same. The carpenter's wages will increase by \$1 per hour, and the door specialist's wages should remain the same. The electrician's wages will increase by \$.50 per hour. Finally, the manufacturing overhead rate will decrease to 25 percent of total direct materials cost. All other costs will remain the same.

REQUIRED

1. Compute the total standard cost of direct materials per front entrance for 20x1.
2. Using your answer 1, compute the total standard unit cost for the Citadel's entrance for 20x1.
3. Compute the new standard unit cost per front entrance for the year 20x2.

LO 4 Direct Materials and LO 5 Direct Labor Variances



- P 2.** The Weavers Packaging Company makes plastic baskets for food wholesalers. Each Type R basket is made of .8 gram of liquid plastic and .6 gram of an additive that includes color and hardening agents. The standard prices are \$.15 per gram of liquid plastic and \$.09 per gram of additive.

Two kinds of direct labor are required: molding and trimming/packing. The direct labor time and rate standards per 100-basket batch are as follows: molding, 1.0 hour per batch at an hourly rate of \$12; trimming/packing, 1.2 hours per batch at \$10 per hour.

During 20x9, the company produced 48,000 Type R baskets. Actual materials used were 38,600 grams of liquid plastic at a total cost of \$5,404 and 28,950 grams of additive at a cost of \$2,895. Actual direct labor included 480 hours for molding at a total cost of \$5,664, and 560 hours for trimming/packing at \$5,656.

REQUIRED

1. Compute the direct materials price and quantity variances for both the liquid plastic and the additive.
2. Compute the direct labor rate and efficiency variances for the molding and trimming/packing processes.

LO 6 Flexible Budget and Performance Evaluation



- P 3.** Maltese Home Products Company manufactures a complete line of kitchen glassware. The Cottonwood Division specializes in 12-ounce drinking glasses. Nona Binyon, the superintendent of the Cottonwood Division, has asked the controller to prepare a performance report for April 20x4. The report at the top of the next page was handed to her a few days later.

Binyon questioned the controller on the report, stating: "Profits have been decreasing in recent months, but this report indicates that our production process is operating efficiently."

REQUIRED

1. Prepare a flexible budget for the Cottonwood Division using production levels of 45,000 units, 50,000 units, and 55,000 units.
2. What is the flexible budget formula?

Cost Category (Variable Unit Cost)	Budget*	Actual Costs Incurred During April	Difference Under (Over) Budget
Direct materials (\$.10)	\$ 5,000	\$ 4,975	\$ 25
Direct labor (\$.12)	6,000	5,850	150
Manufacturing overhead			
Variable			
Indirect labor (\$.03)	1,500	1,290	210
Supplies (\$.02)	1,000	960	40
Heat and power (\$.03)	1,500	1,325	175
Other (\$.05)	2,500	2,340	160
Fixed			
Heat and power	3,500	3,500	—
Depreciation	4,200	4,200	—
Insurance and taxes	1,200	1,200	—
Other	1,600	1,600	—
Totals	<u>\$28,000</u>	<u>\$27,240</u>	<u>\$760</u>

*Based on normal capacity of 50,000 units.

- Assume that the Cottonwood Division produced 46,560 units in April and that all fixed costs remained constant. Prepare a revised performance report similar to the one above, using actual production as a basis for the budget column.
- Which report is more meaningful for performance evaluation, the original one above or the revised one? Why?

**LO 4 Direct Materials, Direct
LO 5 Labor, and Manufacturing
LO 7 Overhead Variances**



- P 4.** The Doormat Division of Ezekiel Rug Company produces a line of all-vinyl mats. Each doormat calls for .4 meter of vinyl material that costs \$3.10 per meter. Standard direct labor hours and cost per doormat are .2 hour and \$1.84 (.2 hour × \$9.20 per hour), respectively. The division's current standard variable overhead rate is \$1.50 per direct labor hour, and the standard fixed manufacturing overhead rate is \$.80 per direct labor hour.

In August 20x5 the division manufactured and sold 60,000 doormats. During the month, 25,200 meters of vinyl material were used at a total cost of \$73,080. The total actual manufacturing overhead costs for August were \$28,200, of which \$18,200 were variable. The total number of direct labor hours worked was 10,800, and the factory payroll for direct labor for August was \$95,040. Normal monthly capacity for the year has been set at 58,000 doormats. Budgeted fixed manufacturing overhead for the period was \$9,280.

REQUIRED

- Compute (a) the direct materials price variance, (b) the direct materials quantity variance, (c) the direct labor rate variance, (d) the direct labor efficiency variance, (e) the controllable manufacturing overhead variance, and (f) the manufacturing overhead volume variance.
- Prepare a performance report based on your variance analysis and suggest possible causes for each variance.

**LO 7 Variance Review: Missing
Information**

REQUIRED



- P 5.** The identification of over- or underapplied manufacturing overhead is the reason for analyzing overhead variances. The controllable manufacturing overhead and manufacturing overhead volume variances are interrelated. Dion Corporation uses a standard costing system, which is shown at the top of the next page.

Fill in the unknown amounts by analyzing the data for the company. Capacities are expressed in machine hours. (**Hint:** Use the structure of Figure 5 in this chapter as a guide for your analysis.)

	Dion Corporation
Actual machine hours	17,100
Standard machine hours allowed	17,500
Normal capacity in machine hours	(e)
Total manufacturing overhead rate per machine hour	(c)
Standard variable manufacturing overhead rate	\$ 2.50
Standard fixed manufacturing overhead rate	(d)
Actual variable and fixed manufacturing overhead	(f)
Total manufacturing overhead applied	(b)
Budgeted fixed manufacturing overhead	\$153,000
Total manufacturing overhead variance	(a)
Controllable manufacturing overhead variance	\$ 1,800 (F)
Manufacturing overhead volume variance	\$ 4,500 (F)

ALTERNATE PROBLEMS

LO 2 Development of Standards: Direct Materials



- P 6.** Worldclocks, Ltd., assembles clock movements for grandfather clocks. Each movement has four components to assemble: the clock facing, the clock hands, the time movement, and the spring assembly. For the current year, 20x1, the company used the following standard costs: clock facing, \$15.90; clock hands, \$12.70; time movement, \$66.10; and spring assembly, \$52.50.

Prices and sources of materials are expected to change in 20x2. Sixty percent of the facings will be supplied by Company A at \$18.50 each, and the remaining 40 percent will be purchased from Company B at \$18.80 each. The hands are produced for Worldclocks, Ltd., by Ajax Hardware, Inc., and will cost \$15.50 per set in 20x2. Time movements will be purchased from three Swiss sources: Company Q, 30 percent of total need at \$68.50 per movement; Company R, 20 percent at \$69.50; and Company S, 50 percent at \$71.90. Spring assemblies will be purchased from a French company and are expected to increase in cost by 20 percent.

REQUIRED

1. Determine the total standard direct materials cost per unit for 20x2.
2. If the company could guarantee the purchase of 2,500 sets of hands from Ajax Hardware, Inc., the unit cost would be reduced by 20 percent. Find the resulting standard direct materials unit cost.
3. Substandard spring assemblies can be purchased at \$50.00, but 20 percent of them will be unusable and cannot be returned. Compute the standard direct materials unit cost if the company follows this procedure, assuming the original facts of the case for the remaining data. The cost of the defective materials will be spread over good units produced.

LO 4 Direct Materials and LO 5 Direct Labor Variances



- P 7.** Sands Trophy Company produces a variety of athletic awards, most in the form of trophies or mounted replicas of athletes in action. Ava Sands, the president of the company, is in the process of developing a standard costing system. The company produces six standard sizes. The deluxe trophy stands three feet tall above the base. Direct materials standards include one pound of metal supported by an 8-ounce wooden base. Standard prices for 20x6 were \$3.30 per pound of metal and \$.45 per ounce of wood.

Direct labor is used in both the Molding and the Trimming/Finishing Departments. Direct labor standards for deluxe trophies specify .2 hour of direct labor in the Molding Department and .4 hour in the Trimming/Finishing Department. Standard direct labor rates for deluxe trophies are \$10.75 per hour in the Molding Department and \$12.00 per hour in the Trimming/Finishing Department.

During January 20x6, 16,400 deluxe trophies were made. Actual production data were as follows:

Direct Materials	
Metal	16,640 pounds @ \$3.25 per pound
Wood	131,400 ounces @ \$.48 per ounce
Direct Labor	
Molding	3,400 hours @ \$10.60 per hour
Trimming/Finishing	6,540 hours @ \$12.10 per hour

REQUIRED

1. Compute the direct materials price and quantity variances for metal and wood.
2. Compute the direct labor rate and efficiency variances for the Molding and the Trimming/Finishing Departments.

- P 8.** During 20x2, Lutz Laboratories, Inc., researched and perfected a cure for the common cold. Called Cold-Gone, the product consists of a series of five tablets and sells for \$28.00 per package. Standard unit costs for this product were developed in late 20x2 for use in 20x3. Per package, the standard unit costs were: chemical ingredients, 6 ounces at \$1.00 per ounce; packaging, \$1.20; direct labor, .8 hour at \$14.00 per hour; standard variable manufacturing overhead, \$4.00 per direct labor hour; and standard fixed manufacturing overhead, \$6.40 per direct labor hour. Normal capacity is 46,875 units per week.

In the first quarter of 20x3, the peak season for colds, demand for the new product rose beyond even the wildest expectations of management. During those three months, the company produced and sold over one-half million packages of Cold-Gone. During the first week in April, 50,000 packages were produced using materials for 50,200 packages costing \$60,240. Chemical use was 305,000 ounces costing \$292,800. Direct labor was 40,250 direct labor hours at a total cost of \$579,600. Total variable manufacturing overhead was \$161,100, and total fixed manufacturing overhead, \$242,000. Budgeted fixed manufacturing overhead for the period was \$240,000.

REQUIRED

1. Compute (a) all direct materials price variances, (b) all direct materials quantity variances, (c) the direct labor rate variance, (d) the direct labor efficiency variance, (e) the controllable manufacturing overhead variance, and (f) the manufacturing overhead volume variance.
2. Prepare a performance report based on your variance analysis and suggest possible causes for each significant variance

- LO 4** Direct Materials, Direct
LO 5 Labor, and Manufacturing
LO 7 Overhead Variances
LO 8



EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

- LO 3** Cost Control Using Variance Analysis



- SD 1.** Holding down operating costs is an ongoing challenge for managers. The lower the costs incurred, the higher the profit. But two factors make a target profit difficult to achieve. First, dozens of possible operating inefficiencies may occur, ranging from human error to unexpected machine breakdowns. Each occurrence causes costs to escalate. On the other hand, if costs are so strictly controlled that cheaper resources are used, the quality of the product or service may suffer and total sales may decline. To control costs and still produce high-quality goods or services, managers must continually assess operating activities by analyzing both financial and nonfinancial data.



Communication



Critical Thinking



Ethics



Group Activity



Hot Links to Real Companies



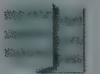
International



Internet



Memo



Spreadsheet

Write a one-page paper discussing how variance analysis helps managers to accomplish cost control objectives. Focus on both the financial and the nonfinancial data used in a standard costing system.

LO 1 Comparison of Standards
LO 8 for Two Types of Service Companies



SD 2.

Two service companies that use a driver and a truck to serve clients are *ChemLawn* and *United Parcel Service* (UPS). ChemLawn provides maintenance services for residential and commercial lawns. The driver has a truck with tanks containing liquids for fertilizer and weed control that are sprayed on the lawns using a hose and pump. The driver for UPS delivers packages to residences and businesses. If you were setting standards for the drivers of these two businesses, what cost components would you use and what standards would you set? What measures of service would you use to set standards? How would the standards for the two service companies be similar and how would they differ? How would the standards for these service companies differ from the standards for a manufacturing company? What performance measures would you suggest for the drivers for each company?

Ethical Dilemma

LO 1 An Ethical Question
LO 3 Involving Standard Costs



SD 3.

Jason Bramwell is the manager of standard costing systems at *Ragnar Industries, Inc.* Standard costs are developed for all product-related direct materials, direct labor, and manufacturing overhead costs. These standard costs are used for pricing products, costing all inventories, and evaluating the performance of all purchasing and production line managers. Ragnar Industries, Inc., updates standard costs whenever costs, prices, or rates change by 3 percent or more; in addition, the company reviews and updates all standard costs annually in December. This practice provides currently attainable standards that are appropriate for use in valuing year-end inventories on Ragnar Industries' financial statements.

On November 30, 20x2, Bramwell received a memo from the company's chief financial officer. The memo said that the company was considering the purchase of another company and that Bramwell and his staff were to concentrate their full effort on analyzing the proposed transaction and postpone adjusting the standards until February or March. In late November, prices on over 20 direct materials had been reduced by 10 percent or more and a new labor contract had reduced several categories of labor rates. Lower standard costs would result in lower inventories, higher cost of goods sold due to inventory writedowns, and lower net income for the year. Bramwell believed that the company was facing an operating loss and that the assignment to evaluate the proposed major purchase was designed primarily to keep his staff from revising and lowering the standards. Bramwell questioned the CFO about the assignment and reiterated the need for updating the standard costs, but he was again told to ignore the update procedure and concentrate on the company purchase. The proposed purchase never materialized, and Bramwell and his staff were removed from the assignment in early February.

Assess Jason Bramwell's actions in this situation. Did this manager follow all ethical paths to solve the problem? What are the consequences of not adjusting the standard costs?

Research Activity

LO 2 Development of Standard
LO 3 Costs



SD 4.

Domino's Pizza is a major purveyor of home-delivered pizzas. Most of Domino's locations are simple storefronts in which the pizza orders are taken and the pizzas are made. Although customers may pick up pizzas, there is no in-store dining. Employees deliver most pizzas using their own cars. Specify what a standard costing system for a Domino's pizza store would entail. Where would you obtain the information for determining the standards? In what ways will the use of standards help in managing a pizza outlet? Visit a pizza outlet, if necessary, to gain a better understanding of the operation. (It does not have to be a Domino's.)



Group Activity: Have students work in groups to complete SD 4. Select one person from each group to report the group's findings to the class.

LO 5 Annuity Life Insurance
LO 7 Company—Standard Costing
in a Service Industry



Decision-Making Practice

SD 5.

The *Annuity Life Insurance Company* (ALIC) markets several types of life insurance policies, but its permanent, 20-year life annuity policy (P20A) is its most popular product. The P20A policy sells in \$10,000 increments and features variable percentages of whole life insurance and single-payment annuity, depending on the potential policyholder's needs and age. An entire department is devoted to developing and marketing the P20A policy. ALIC has determined that both the policy developer and the policy salesperson contribute to the creation of each policy, so ALIC categorizes those people as direct labor for variance analysis, cost control, and performance evaluation. For unit costing, each \$10,000 increment is considered 1 unit. Therefore, a \$90,000 policy is counted as 9 units.

Standard unit cost information for the period is as follows:

Direct labor	
Policy developer	
3 hours at \$12.00 per hour	\$ 36.00
Policy salesperson	
8.5 hours at \$14.20 per hour	120.70
Operating overhead	
Variable operating overhead	
11.5 hours at \$26.00 per hour	299.00
Fixed operating overhead	
11.5 hours at \$18.00 per hour	207.00
Standard unit cost	<u>\$662.70</u>

Actual costs incurred during January for the 265 units sold were as follows:

Direct labor	
Policy developers	
848 hours at \$12.50 per hour	\$10,600.00
Policy salespeople	
2,252.5 hours at \$14.00 per hour	31,535.00
Operating overhead	
Variable operating overhead	78,440.00
Fixed operating overhead	53,400.00

Normal monthly capacity was 260 units, and the budgeted fixed operating overhead for the month was \$53,820.

1. Compute the standard hours allowed in January for policy developers and policy salespeople.
2. What should have been the total standard costs for January? What were the total actual costs that the company incurred for January? Compute the total cost variance for the period.
3. Compute the direct labor rate and efficiency variances for policy developers and policy salespeople.
4. Compute the operating overhead variances for January.
5. Identify possible causes for each variance and suggest possible solutions.

MANAGERIAL REPORTING AND ANALYSIS

Interpreting Management Reports

MRA T.

Boris Realtors, Inc., specializes in home resales. Revenue is earned from selling fees. Commissions for salespersons, listing agents, and listing companies are the main costs for the company. Business has improved steadily over the last ten years. As usual, Bonnie Boris, the managing partner of Boris Realtors, Inc., received a report summarizing the performance for the most recent year.

LO 6 Flexible Budgets and
LO 8 Performance Evaluation



Boris Realtors, Inc.
Performance Report
For the Year Ended December 31, 20x5

	Budget*	Actual**	Difference Under (Over) Budget
Total Selling Fees	\$2,052,000	\$2,242,200	(\$190,200)
Less Variable Costs			
Sales Commissions	\$1,102,950	\$1,205,183	(\$102,233)
Automobile	36,000	39,560	(3,560)
Advertising	93,600	103,450	(9,850)
Home Repairs	77,400	89,240	(11,840)
General Overhead	656,100	716,970	(60,870)
	\$1,966,050	\$2,154,403	(\$188,353)
Less Fixed Costs			
General Overhead	60,000	62,300	(2,300)
Total Costs	\$2,026,050	\$2,216,703	(\$190,653)
Net Income	\$ 25,950	\$ 25,497	\$ 453

*Budgeted data based on 180 home resales.

**Actual selling fees and operating costs of 200 home resales.

REQUIRED

1. Analyze the performance report. What does it say about the performance of the company? Is the performance report reliable? Explain.
2. Calculate the budgeted selling fee and budgeted variable costs per home resale.
3. Prepare a performance report using a flexible budget based on the actual number of home resales.
4. Analyze the report you prepared in 3. What does it say about the performance of the company? Is the performance report reliable? Explain.
5. What recommendations would you make to improve next year's performance?

Formulating Management Reports

MHA 2.

Troy Corrente, the president of *Forest Valley Spa*, is concerned about the spa's operating performance in March 20x4. He carefully budgeted his costs so that he could reduce the 20x4 membership fees. Now he needs to monitor those costs to make sure that the spa's profits are at the level he expected.

He has asked you, as the controller for the spa, to prepare a performance report for the operating labor and overhead costs. He also wants you to analyze the report and suggest possible causes for any problems you find. He needs your work immediately so that any problems can be quickly solved. The following information is available:

	Standard	Actual
Variable costs		
Operating labor	\$ 10,880	\$12,150
Utilities	2,880	3,360
Repairs and maintenance	5,760	7,140
Fixed costs		
Depreciation, equipment	2,600	2,680
Rent	3,280	3,280
Other	1,704	1,860
Totals	\$27,104	\$30,470

LO 3 Preparing Performance
LO 5 Reports



Normal operating hours call for eight operators to work 160 hours each per month. During March, nine operators worked an average of 150 hours each.

REQUIRED

- Answer the following questions about preparing performance reports.
 - Who needs the performance report?
 - Why are you preparing the performance report?
 - What information do you need to develop the performance report? How will you obtain that information?
 - When must you have the performance report and analysis prepared?
- With this limited information, compute the operating labor rate variance, the operating labor efficiency variance, and the operating controllable overhead variance.
- Prepare a performance report for the month. Analyze the report and suggest possible causes for any problems that you find.

International Company

MRA 3.

Ming Nu recently became the controller of a joint venture in Hong Kong. Nu created a standard costing system to help plan for and control the company's activities. After completing the first quarter of operations using standard costing, Nu met with the budget team, which included managers from purchasing, engineering, production, and personnel. He asked them to share any problems that occurred during the quarter. He planned to use the information to analyze the variances that his staff would calculate.

LO 4 Variance Analysis

LO 5



REQUIRED

For each of the following situations, identify the direct materials and/or direct labor variance(s) that could be affected and indicate the direction (favorable or unfavorable) of those variances.

- The production department used highly skilled, higher-paid workers.
- Machines were improperly adjusted.
- Direct labor personnel worked more carefully to manufacture the product.
- The product design engineer substituted a direct material that was less expensive and of lower quality.
- The Purchasing Department bought higher-quality materials at a higher price.
- A major supplier used a less-expensive mode of transportation to deliver the raw materials.
- Work was halted for two hours because of a power disruption.

Excel Spreadsheet Analysis

MRA 4.

Ella Mae Collins is the controller for *FH Industries*. She has asked you, her new assistant, to prepare an analysis from the following data related to projected and actual manufacturing overhead costs for October 20x8:

LO 6 Flexible Budget

LO 7 Development and Manufacturing Overhead Variance Analysis



	Standard Variable Costs per Machine Hour (MH)	Actual Variable Costs Incurred in October
Indirect materials and supplies	\$1.10	\$ 2,380
Indirect machine setup labor	2.50	5,090
Materials handling	1.40	3,950
Maintenance and repair	1.50	2,980
Utilities	.80	1,490
Miscellaneous	.10	200
Totals	<u>\$7.40</u>	<u>\$16,090</u>

	Budgeted Fixed Manufacturing Overhead	Actual Fixed Manufacturing Overhead in October
Supervisory salaries	\$ 3,630	\$ 3,630
Machine depreciation	8,360	8,580
Other	1,210	1,220
Totals	<u>\$13,200</u>	<u>\$13,430</u>

During October, the number of good units produced was used to compute the 2,100 standard machine hours allowed. Your analysis of these data should include the steps outlined below.

REQUIRED

1. Prepare a monthly flexible budget for the company for operating activity at 2,000 machine hours, 2,200 machine hours, and 2,500 machine hours.
2. Formulate a flexible budget formula for the company.
3. The company's normal operating capacity is 2,200 machine hours per month. Compute the fixed manufacturing overhead rate at this level of activity. Then break the rate down into individual rates for each element of fixed manufacturing overhead.
4. Prepare a detailed comparative cost analysis for October. All variable and fixed manufacturing overhead costs should be included. Your report form should include the following five columns: (a) cost category, (b) cost per machine hour, (c) costs applied, (d) actual costs incurred, and (e) variance.
5. Develop a manufacturing overhead variance analysis for October that identifies the controllable manufacturing overhead variance and the manufacturing overhead volume variance.
6. Prepare an analysis of the variances. Are some of the fixed costs controllable by the manager? Defend your answer.

Internet Case**MRA 5.****LO 1 Resources for Development of Standards**

Assume that you have recently taken a job at a company that manufactures components for automobiles. You have been assigned the task of establishing manufacturing standards. You want to gather as much background information as you can about the development of manufacturing standards and hope to find organizations that can give you helpful information.

Use a standard search engine, such as Yahoo, to search for sites about standards, manufacturing, and automobile manufacturers that may be of help. Visit the sites that look most interesting. Make a list of the five sites you think will be most useful. Bring your list to class and compare your findings with those of your classmates.

ENDNOTES

1. <http://www.rubgrp.com/main.html>. Other sources include brochures and practice manual pages received from The Rubicon Group and a personal telephone interview with Dennis Evans, of the Rubicon Group, January 30, 1998.
2. "Up to Speed: United Parcel Service Gets Deliveries Done by Driving Its Workers," *The Wall Street Journal*, April 22, 1986.
3. Carole Cheatham, "Updating Standard Cost Systems," *Journal of Accountancy*, The American Institute of Certified Public Accountants, December 1990.
4. http://www.euro.net/innovation/Management_Base_/Man_Guide_Rel_1.081/controland-monitoring.html, July 14, 1997.

Performance Management and Evaluation

LEARNING OBJECTIVES

- 1** Describe how the balanced scorecard aligns performance with organizational goals and explain the balanced scorecard's role in the management cycle.
- 2** Discuss performance measurement and state the issues that affect management's ability to measure performance.
- 3** Define *responsibility accounting* and describe the role responsibility centers play in performance management and evaluation.
- 4** Prepare performance reports for the various types of responsibility centers, including reports based on flexible budgets for cost centers and variable costing for profit centers.
- 5** Use the traditional performance measures of return on investment and residual income to evaluate investment centers.
- 6** Use economic value added to evaluate investment centers.
- 7** Explain how properly linked performance incentives and measures add value for all stakeholders in performance management and evaluation.



DECISION POINT: A MANAGER'S FOCUS



Vail Resorts

PEAKS at Vail Resorts is an all-in-one card for guests of four Colorado vacation spots. The PEAKS card can be used at Vail, Breckenridge, Keystone, and Beaver Creek resorts to pay for lift tickets, skiing or snowboarding lessons, equipment rentals, dining, and more. Guests like its convenience and its program for earning points toward free or reduced-rate lift tickets, dining, and lodging. Guests enroll in the PEAKS system by filling out a one-page form that asks for their name, street address, e-mail address, phone number, date of birth, credit card number, and a signed charge privilege authorization. Data for up to eight family members may be linked into one membership account. Each family member receives a bar-coded picture identification card that is scanned each time he or she rides the ski lifts, attends ski school, or charges purchases, dining, or lodging. The card is usually worn on a souvenir cord around the guest's neck and can be used whenever the guest visits one of the four resorts.¹ How can the managers of the Vail Resorts Management Company use the PEAKS card and its integrated data base to better manage and evaluate the performance of their resorts?

Managers like PEAKS because it enables them to collect huge amounts of information in a very simple way and because the data have so many uses. Guests enter new data each time they scan their cards. Those data become part of an integrated management information system that allows managers to measure and control costs, quality, and performance at all four resorts. The system's ability to store both financial and nonfinancial data about all aspects of the resorts enables the managers to learn about and balance the interests of all the company's stakeholders: financial (investors), learning and growth (employees), internal business processes, and customers. The system allows managers to answer traditional financial questions about measuring cost of sales and valuing inventory (such as food ingredients in its restaurants and merchandise in its shops) and to obtain performance information about the resorts' activities, products, services, and customers. In addition, managers and employees receive timely feedback about their performance measures so that they can continuously improve.

Organizational Goals and the Balanced Scorecard

OBJECTIVE

1 Describe how the balanced scorecard aligns performance with organizational goals and explain the balanced scorecard's role in the management cycle

The **balanced scorecard**, developed by Robert S. Kaplan and David P. Norton, is a framework that links the perspectives of an organization's four basic stakeholder groups—financial (investors), learning and growth (employees), internal business processes, and customers—with the organization's mission and vision, performance measures, strategic plan, and resources. To succeed, an organization must add value for all groups in both the short and the long term. Thus, an organization will determine each group's objectives and translate them into performance measures that have specific, quantifiable performance targets. Ideally, managers should be able to see how their actions contribute to the achievement of organizational goals and understand how their compensation is related to their actions. The balanced scorecard assumes that an organization will get only what it measures.

VIDEO CASE



Harley-Davidson, Inc.

Objectives

- To describe the role a performance measurement and evaluation system plays in business today.
- To become familiar with how the balanced scorecard provides a framework for performance management and accountability.
- To show how responsibility accounting is useful in performance evaluation.
- To understand the value of linking organizational goals, objectives, measures, targets, and performance-based pay.

Background for the Case


Harley-Davidson continues to excel at providing motorcyclists and the general public an expanding line of motorcy-



cles and branded products and services. Strong sales of motorcycles, apparel, parts, insurance, product licensing, and financial services have enabled the company to sustain and improve upon its success. Harley's


journey to success can be charted through its performance management and evaluation system. Performance measures like market share, units shipped, revenue, operating

profit, and number of employees illustrate its remarkable turnaround. In the 1980s, Harley overcame near bankruptcy to emerge today as the internationally recognized company that “fulfills dreams through the experience of motorcycling.” Like many other companies, Harley-Davidson uses a performance management and evaluation system to identify how well it is doing, where it is going, and what improvements will make it more profitable.

 For more information about Harley-Davidson, Inc., visit the company's web site through the Needles Accounting Resource Center at

<http://college.hmco.com>

Required

 View the video on Harley-Davidson that accompanies this book. As you are watching the video, take notes related to the following questions

1. What role does performance measurement and evaluation play in business today?
2. In your own words, describe the balanced scorecard. Who are its stakeholders?
3. Define responsibility accounting. Why is it useful in performance evaluation?
4. Explain how Harley uses PEP to link performance goals, objectives, measures, and targets. Why does this linking process improve the effectiveness of its performance management and evaluation system?

The Balanced Scorecard and the Management Cycle

We will use the Decision Point about the PEAKS card to illustrate the use of the balanced scorecard in the management cycle.

PLANNING During the planning stage, the balanced scorecard provides a framework that enables managers to translate their organization's vision and strategy into operational terms. Managers evaluate the company vision from the perspective of each stakeholder group and seek to answer one key question for each group:

- **Financial (investors):** To achieve our organization's vision, how should we appear to our shareholders?
- **Learning and growth (employees):** To achieve our organization's vision, how should we sustain our ability to improve and change?
- **Internal business processes:** To succeed, at what business processes must our organization excel?
- **Customers:** To achieve our organization's vision, how should we appear to our customers?

These key questions align the organization's strategy from all perspectives and result in performance objectives that are mutually beneficial to all stakeholders. Once the organization's objectives are set, managers can select performance measures and set performance targets to translate objectives into an action plan.



For example, if Vail Resorts' collective vision and strategy is customer satisfaction, the following overall objectives might be established:

Perspective	Objective
Financial (investors)	Customer satisfaction means revenue growth.
Learning and growth (employees)	Customer satisfaction means cross-trained, customer-service-oriented employees.
Internal business processes	Customer satisfaction means reliable products and short delivery cycles.
Customers	Customer satisfaction means keeping customer loyalty through repeat visits and redeemed PEAKS points.

These overall objectives would be translated into specific performance objectives and measures for managers. For example, a ski lift manager's performance objective for customer satisfaction might be measured in terms of the following:

- **Financial (investors):** hourly lift cost, lift ticket sales in dollars and in units
- **Learning and growth (employees):** number of cross-trained tasks per employee, employee turnover
- **Internal business processes:** number of accident-free days, number and cost of mechanical breakdowns, average lift cycle time (that is, the time between getting in line to ride the ski lift and completing the ski run)
- **Customers:** average number of ski runs per daily lift ticket, number of repeat customers, number of PEAKS points redeemed

Figure 1 summarizes the planning stage of the management cycle, during which Vail Resorts' managers first link their organization's vision and strategy to objectives, then link the objectives to logical performance measures, and, finally, set performance targets. As a result, a ski lift manager will have a mix of performance measures that balances the perspectives and needs of all stakeholders.



Figure 1
Sample Balanced Scorecard of
Linked Objectives, Measures,
and Targets

Source: Adapted from Robert S. Kaplan and David P. Norton, "Using the Balanced Scorecard as a Strategic Management System," *Harvard Business Review*, January–February 1996.

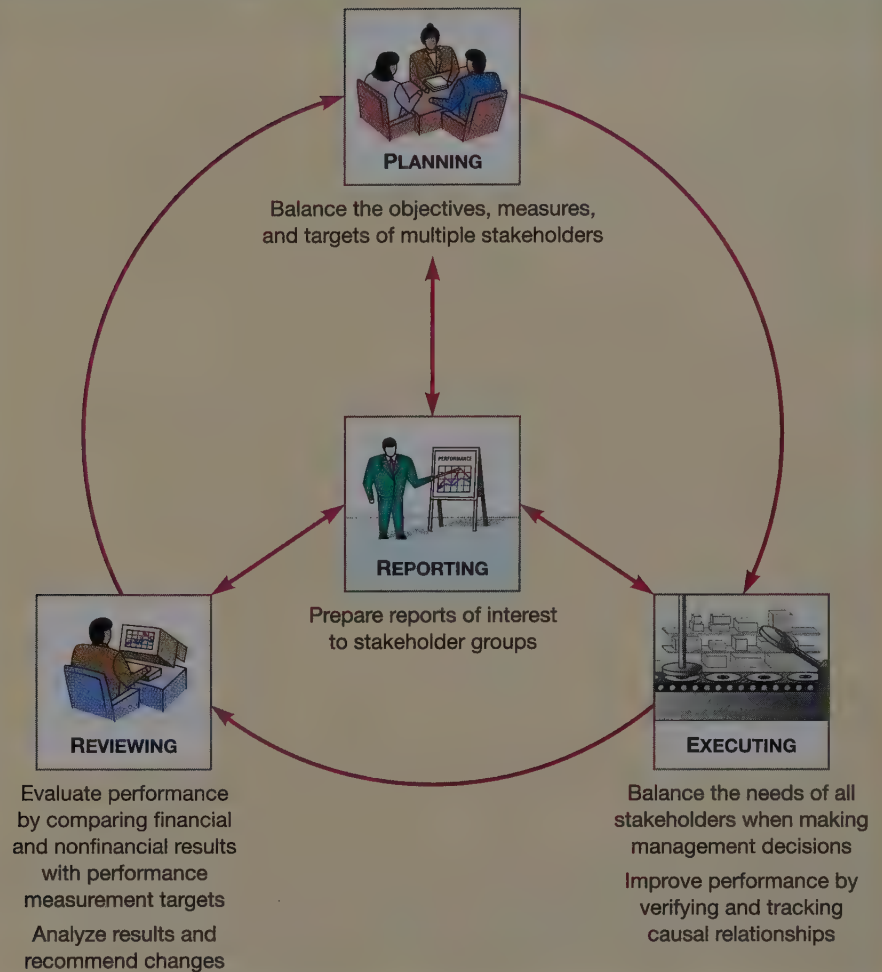


EXECUTING Managers use the mutually agreed-upon strategic objectives for the entire organization as the basis for decision making within their individual areas of responsibility. This practice ensures that they consider the needs of all stakeholder groups. For example, when making decisions about available ski lift capacity, the ski lift manager at Vail Resorts will balance such factors as lift-ticket sales, snow conditions, equipment reliability, trained staff availability, and length of wait for ski lifts.

When managers understand the causal relationship between their actions and their company's overall performance, they can see new ways to be more effective. For example, a ski lift manager may hypothesize that short waiting lines for the ski lifts would improve customer satisfaction and lead to more visits to the ski lift. The ski lift manager could test this possible cause-and-effect relationship by measuring and tracking the length of ski lift waiting lines and the number of visits to the ski lift. If a causal relationship exists, the manager can improve the performance of the ski lift operation by doing everything possible to ensure that waiting lines are short.

REVIEWING Managers will review financial and nonfinancial results frequently during the year, at year end, and over longer periods to evaluate their strategies in meeting the objectives and performance targets set during the planning stage. They will compare performance objectives and targets with actual results to determine if the targets were met, what measures need to be changed, and what strategies or

Figure 2
The Balanced Scorecard and
the Management Cycle



objectives need revision. For example, the ski lift manager at Vail Resorts would analyze the reasons for performance gaps and make recommendations to improve the performance for the ski lift area.

FOCUS ON BUSINESS PRACTICE



Harley-Davidson, Inc., has identified not four but six stakeholder groups. In addition to balancing the needs of investors, employees, business processes, and customers, Harley managers also consider the interests of government and the community at large. Taking a broader perspective enables the company to sustain its competitive advantage and implement effective employee reward programs.²

REPORTING Finally, during the reporting stage of the management cycle, a variety of reports are prepared. For example, the data base makes it possible to prepare financial performance reports, customer PEAKS statements, internal business process reports for targeted performance measures and results, and performance appraisals of individual employees. Such reports enable managers to monitor and evaluate performance measures that add value for stakeholder groups.

As you can see in Figure 2, the balanced scorecard adds dimension to the management cycle. Managers plan, execute, review, and report on the organization's performance from multiple perspectives. By balancing all stakeholders' needs, managers are more likely to achieve their objectives in both the short and the long term.

Performance Measurement

OBJECTIVE

2 Discuss performance measurement and state the issues that affect management's ability to measure performance

One of the biggest recent challenges for managers is the realization that as a company's management philosophy changes, so must the measures in its performance management and evaluation system. A **performance management and evaluation system** is a set of procedures that account for and report on both financial and nonfinancial performance, so that a company can identify how well it is doing, where it is going, and what improvements will make it more profitable.

What to Measure, How to Measure

Performance measurement is the use of quantitative tools to gauge an organization's performance in relation to a specific goal or an expected outcome. For performance measurement to succeed, managers must be able to distinguish between what is being measured and the actual measures used to monitor performance. For instance, product or service quality is not a performance measure. It is part of a management strategy: management wants to produce the highest-quality product or service possible, given the resources available. Product or service quality is what management wants to measure. To measure product or service quality, managers must collaborate with other managers to develop a group of measures, such as the balanced scorecard, that will identify changes in product or service quality and help employees determine what needs to be done to improve quality.

Other Measurement Issues

Each organization must develop a unique set of performance measures appropriate to its specific situation. In addition to answering the basic questions of what to measure and how to measure, management must consider a variety of other issues, including the following:

- What performance measures can be used?
- How can managers monitor the level of product or service quality?
- How can managers monitor production and other business processes to identify areas that need improvement?
- How can managers measure customer satisfaction?
- How can managers monitor financial performance?
- Are there other stakeholders to whom a manager is accountable?
- What performance measures do government entities impose on the company?
- How can a manager measure the company's effect on the environment?

FOCUS ON INTERNATIONAL BUSINESS

The *tableau de bord*, or "dashboard," was developed by French process engineers around 1900 as a concise performance measurement system that helped managers understand the cause-and-effect relationships between business actions and performance. The indica-

tors, both financial and nonfinancial, allowed managers at any level to monitor their progress in terms of the mission and objectives of their unit and their company overall. Like a set of nested Russian dolls, each unit's key success factors and key performance indicators were integrated with those of other units with which it was interdependent and needed to collaborate. The dashboard continues to encourage a performance measurement system that focuses on and supports an organization's strategic plan.³

Responsibility Accounting

OBJECTIVE

3 Define *responsibility accounting* and describe the role responsibility centers play in performance management and evaluation



As part of their performance management systems, many organizations assign resources to specific areas of responsibility and track how the managers of those areas use those resources. For example, DaimlerChrysler Corp. assigns resources to its Jeep, Eagle, and Mercedes automotive divisions and holds the managers of those divisions responsible for generating revenue and managing costs. In addition, the company may give the managers resources to invest in assets that will support the growth of their divisions. Within each division, other managers are assigned responsibility for such tasks as manufacturing subassemblies or assembling automobiles. All managers at all levels are then evaluated in terms of their ability to manage their areas of responsibility in keeping with organizational goals.

To assist in performance management and evaluation, many organizations use responsibility accounting. **Responsibility accounting** is an information system that classifies data according to areas of responsibility and reports each area's activities by including only the revenue, cost, and resource categories that the assigned manager can control. A **responsibility center** is an organizational unit whose manager has been assigned the responsibility of managing a portion of the organization's resources. The activity of a responsibility center dictates the extent of a manager's responsibility.

Types of Responsibility Centers

There are five types of responsibility centers: (1) cost centers, (2) discretionary cost centers, (3) revenue centers, (4) profit centers, and (5) investment centers.

COST CENTERS A responsibility center whose manager is accountable only for controllable costs that have well-defined relationships between the center's resources and products or services is called a **cost center**. Manufacturing companies such as DaimlerChrysler, Apple Computer, and Kraft use cost centers to manage assembly plants, where the relationship between the costs of resources (direct material, direct labor) and the resulting products is well defined.



Nonmanufacturing organizations use cost centers to manage activities in which resources are clearly linked with a service provided at no additional charge. For example, in nursing homes and hospitals, there is a clear relationship between the costs of food and direct labor and the number of inpatient meals served.

The performance of a cost center is usually evaluated by comparing an activity's actual cost with its budgeted cost and analyzing the resulting variances. You may recall this performance evaluation process from the chapter on standard costing.

DISCRETIONARY COST CENTERS A responsibility center whose manager is accountable for costs only and in which the relationship between resources and products or services produced is not well defined is called a **discretionary cost center**. Units that perform administrative activities, such as accounting, human resources, and legal services, are typical examples of discretionary cost centers. These centers, like cost centers, have approved budgets that set spending limits.

Because the spending and use of resources in discretionary cost centers are not clearly linked to the production of a product or service, cost-based measures cannot usually be used to evaluate performance (although such centers are penalized if they exceed their approved budgets). For example, among the performance measures used to evaluate the research and development activities at manufacturing companies such as DaimlerChrysler, Monsanto, and Intel are the number of patents obtained and the number of cost-saving innovations developed. At service organizations, such as the United Way, a common measure of administrative activities is how low their costs are as a percentage of total contributions.





REVENUE CENTERS A responsibility center whose manager is accountable primarily for revenue and whose success is based on its ability to generate revenue is called a **revenue center**. Examples of revenue centers are Hertz's national car reservation center and the clothing retailer Nordstrom's e-commerce order department. A revenue center's performance is usually evaluated by comparing its actual revenue with its budgeted revenue and analyzing the resulting variances. Performance measures at both manufacturing and service organizations may include sales dollars, number of customer sales, or sales revenue per minute.



PROFIT CENTERS A responsibility center whose manager is accountable for both revenue and costs and for the resulting operating income is called a **profit center**. A good example is the local store of a national chain such as Wal-Mart, Kinko's, or Jiffy Lube. The performance of a profit center is usually evaluated by comparing the figures in its actual income statement with the figures in its master or flexible budget income statement. You may recall this type of comparison from previous chapters.



INVESTMENT CENTERS A responsibility center whose manager is accountable for profit generation and can also make significant decisions about the resources the center uses is called an **investment center**. For example, the president of DaimlerChrysler's Jeep Division, the president of Harley-Davidson's Buell subsidiary, and the president of Brinker International's Chili's Grill and Bar Concept can control revenues, costs, and the investment of assets to achieve organizational goals. The performance of these centers is evaluated using such measures as return on investment, residual income, and economic value added. These measures are used in all types of organizations, both manufacturing and nonmanufacturing, and are discussed later in this chapter.

The key characteristics of the five types of responsibility centers are summarized in Table 1.

Organizational Structure and Performance Management

Much can be learned about an organization by examining how its managers organize activities and resources. A company's organizational structure formalizes its lines of managerial authority and control. An **organization chart** is a visual representation of an organization's hierarchy of responsibility for the purposes of management control. Within an organization chart, the five types of responsibility centers are arranged by level of management authority and control.

A responsibility accounting system establishes a communications network within an organization that is ideal for gathering and reporting information about the operations of each area of responsibility. The system is used to prepare budgets

FOCUS ON BUSINESS TECHNOLOGY

There is a new profession—information architect. An information architect develops meaningful ways to report information in print and on the web. In *Understanding*

USA, Richard Saul Wurman and a team of 12 information architects have created a graph-rich book (downloadable at <http://www.understandingusa.com> or for sale in bookstores) that is the result of a \$1 million project backed by many blue-chip organizations. The team's message to managers: Keep it simple. If you define what is important and what you can omit, and if you stay honest, reporting information becomes simple.⁴

Table 1. Types of Responsibility Centers

Responsibility Center	Manager Accountable For	How Performance Is Measured	Examples
Cost center	Only controllable costs; there are well-defined links between the costs of resources and the resulting products or services	Compare actual costs with flexible and master budget costs Analyze resulting variances	Product: Manufacturing assembly plants Service: Food service for hospital inpatients
Discretionary cost center	Only controllable costs; the links between the costs of resources and the resulting products or services are <i>not</i> well defined	Compare actual non-cost-based measures with targets Determine compliance with preapproved budgeted spending limits	Product or service: Administrative activities such as accounting, human resources, and research and development
Revenue center	Revenue generation	Compare actual revenue with budgeted revenue Analyze resulting variances	Product: Phone or e-commerce sales for pizza delivery Service: National car-rental reservation center
Profit center	Operating income resulting from controllable revenues and costs	Compare actual variable costing income statement with the budgeted income statement	Product or service: Local store of a national chain such as Wal-Mart, Kinko's, or Jiffy Lube
Investment center	Controllable revenues, costs, and the investment of resources to achieve organizational goals	Return on investment Residual income Economic value added	Product: Jeep Division of DaimlerChrysler Service: Chili's Grill and Bar Concept of Brinker International, Inc.

by responsibility area and to report the actual results of each responsibility center. The report for a responsibility center should include only the costs, revenues, and resources the manager of that center can control. Such costs and revenues are called **controllable costs and revenues** because they result from a manager's actions, influence, or decisions. A responsibility accounting system ensures that managers will not be held responsible for items they cannot change.

By examining a typical corporate organization chart, you can see how a responsibility accounting system works. Figure 3 shows part of the management structure for Café Cubano, a multiconcept restaurant chain like Brinker International, Inc., or Vicorp Restaurants. Typically, several vice presidents report to the president of a restaurant division like Chili's or Village Inn. Notice that the figure shows examples of all five types of responsibility centers. The office of Consuelo Jorge, the division president, is an investment center because capital investment decisions are made at the division level. The Vice President—Restaurants, Ruben Lopez, manages both profit and revenue centers. The Vice President—Administration, Manuel Segundo, supervises three discretionary cost centers, and the Vice President—Food Products, Orlena Torres, is responsible for the operation of the central kitchen, a cost center.

In a responsibility accounting system, the performance reports for each level of management are tailored to each manager's individual needs for information. Because the system provides a report for every manager and because lower-level managers report to higher-level managers, the same information may appear in varying formats in several different reports. When information about lower-level operations appears in upper-level managers' reports, it is usually summarized and

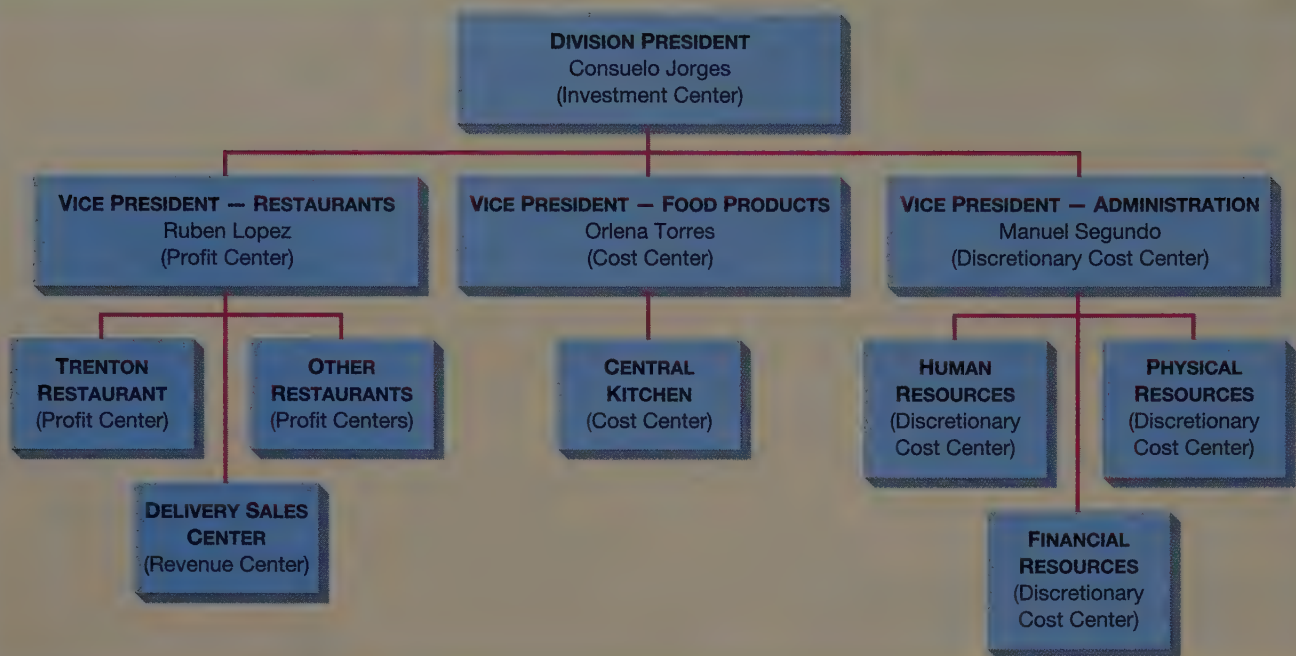


Figure 3
Partial Organization Chart of
Café Cubano, a Restaurant
Chain

condensed. Performance reporting by responsibility level enables an organization to trace the source of a cost, revenue, or resource to the manager who controls it and to evaluate that manager's performance accordingly.

Performance Evaluation

OBJECTIVE

4 Prepare performance reports for the various types of responsibility centers, including reports based on flexible budgets for cost centers and variable costing for profit centers

Because performance reports contain information about costs, revenues, and resources that are controllable by individual managers, they allow comparisons between actual performance and budget expectations. Such comparisons allow management to evaluate an individual's performance with respect to responsibility center objectives and companywide objectives and to recommend changes. It is important to emphasize that performance reports should contain only costs, revenues, and resources controllable by the manager. If a performance report includes items that the manager cannot control, the credibility of the entire responsibility accounting system can be called into question. It is up to management to structure and interpret the performance results fairly.

The content and format of a performance report depend on the nature of the responsibility center. Let us now take a closer look at the performance reports for cost centers and profit centers.

Evaluating Cost Center Performance

Orlena Torres, the Vice President—Food Products at Café Cubano, is responsible for the central kitchen, where basic preparation is done on the various food products the restaurants sell. Because the costs in the central kitchen have well-defined relationships with the resulting products, it is a cost center. To ensure that the central kitchen is meeting its performance goals, Torres has decided to evaluate the performance of each food item produced. To do so, she will prepare a separate

Exhibit 1**Central Kitchen's Performance Report
on Café Cubano's House Dressing**

	Actual Results	Variance	Flexible Budget	Variance	Master Budget
Gallons produced	1,200	0	1,200	200 (U)	1,000
Center costs					
Direct materials (\$.25 per gallon)	\$312	\$12 (U)	\$300	\$50 (U)	\$250
Direct labor (\$.05 per gallon)	72	12 (U)	60	10 (U)	50
Variable overhead (\$.03 per gallon)	33	3 (F)	36	6 (U)	30
Fixed overhead	2	3 (F)	5	0	5
Total cost	<u>\$419</u>	<u>\$18 (U)</u>	<u>\$401</u>	<u>\$66 (U)</u>	<u>\$335</u>
Performance measures					
Defect-free gallons to total produced	.98	.01 (U)	N/A		.99
Average throughput time per gallon	11 minutes	1 minute (F)	N/A		12 minutes

Note: (F) = favorable comparison; (U) = unfavorable comparison.

report for each product that compares its actual costs with the corresponding amounts from the flexible and master budgets. The performance report for Café Cubano's House Dressing, one of the chain's signature menu items, is presented in Exhibit 1.

FLEXIBLE BUDGETING You will recall that favorable (positive, or F) and unfavorable (negative, or U) variances between actual costs and the flexible budget can be further examined by using standard costing to compute specific variances for direct materials, direct labor, and manufacturing overhead. Also, you will remember that the flexible budget is a cost control tool used to evaluate performance and is derived by multiplying actual unit output by the standard unit costs. Refer to the chapter on standard costing for further information on performance evaluation using variances or the flexible budget.

Evaluating Profit Center Performance

Ruben Lopez, the Vice President—Restaurants, oversees many restaurants. Because the restaurants are profit centers, each is accountable for its own revenues and costs, and for the resulting operating income. A profit center's performance is usually evaluated by comparing its actual income statement results to its budgeted income statement.

VARIABLE COSTING Variable costing is a method of preparing profit center performance reports that classifies a manager's controllable costs as either variable or fixed. Variable costing produces a variable costing income statement instead of a traditional income statement. A variable costing income statement is the same as a contribution income statement, the format of which you may recall from its use in cost-volume-profit analysis. Such an income statement is useful in performance management and evaluation because it focuses on cost variability and the profit center's contribution to operating income.

When variable costing is used to evaluate profit center performance, the variable cost of goods sold and the variable selling and administrative expenses are subtracted from sales to arrive at the contribution margin for the center. All controllable fixed costs of a profit center, including those from manufacturing, selling, or

Exhibit 2**Variable Costing Income Statement Versus Traditional Income Statement for Trenton Restaurant**

Variable Costing Income Statement		Traditional Income Statement	
Sales	\$2,500	Sales	\$2,500
Variable cost of goods sold	1,575	Cost of goods sold	1,745
Variable selling expenses	325	(\$1,575 + \$170 = \$1,745)	
Contribution margin	\$ 600	Gross margin	\$ 755
Fixed manufacturing costs	170	Variable selling expenses	325
Fixed selling expenses	230	Fixed selling expenses	230
Profit center income	<u>\$ 200</u>	Profit center income	<u>\$ 200</u>

administrative activities, are subtracted from the contribution margin to determine the operating income.

The variable costing income statement differs from the traditional income statement prepared for financial reporting, as illustrated by the two versions of income statements in Exhibit 2 for Trenton Restaurant, part of the Café Cubano restaurant chain. In the traditional income statement, all manufacturing costs are assigned to cost of goods sold, but in the variable costing income statement, only the variable manufacturing costs are included. Under variable costing, direct materials costs, direct labor costs, and variable manufacturing overhead costs are the only cost elements used to compute variable cost of goods sold. Fixed manufacturing costs are considered costs of the current accounting period. Notice that fixed manufacturing costs are listed with fixed selling expenses after the contribution margin has been computed.

The manager of a profit center may also want to measure and evaluate non-financial information. For example, Ruben Lopez of Café Cubano may want to track the number of food orders processed and the average amount of a sales order at Trenton Restaurant. The resulting report, based on variable costing and flexible budgeting, is shown in Exhibit 3.

Exhibit 3.**Performance Report Based on Variable Costing and Flexible Budgeting for Trenton Restaurant**

	Actual Results	Variance	Flexible Budget	Variance	Master Budget
Meals served	750		750	250 (U)	1,000
Sales (average meal \$2.85)	\$2,500.00	\$362.50 (F)	\$2,137.50	\$712.50 (U)	\$2,850.00
Controllable variable costs					
Variable cost of goods sold (\$1.50)	1,575.00	\$450.00 (U)	1,125.00	375.00 (F)	1,500.00
Variable selling expenses (\$.40)	325.00	75.00 (U)	300.00	100.00 (F)	400.00
Contribution margin	\$ 600.00	\$112.50 (U)	\$ 712.50	\$237.50 (U)	\$ 950.00
Controllable fixed costs					
Fixed manufacturing	170.00	30.00 (F)	200.00	0.00	200.00
Fixed selling	230.00	20.00 (F)	250.00	0.00	250.00
Profit center income	<u>\$ 200.00</u>	<u>\$162.50 (U)</u>	<u>\$ 262.50</u>	<u>\$237.50 (U)</u>	<u>\$ 500.00</u>
Other nonfinancial performance measures					
Number of orders processed	300	50 (F)	N/A		250
Average sales order	\$8.34	\$3.06 (U)	N/A		\$11.40

Note: (F) = favorable comparison; (U) = unfavorable comparison.

FOCUS ON BUSINESS ETHICS

In Saarlouis, Germany, old blue jeans have found a new use as sound-deadening material in Ford Motor Company cars. Because of Ford's ethical recycling practices, old jeans are shredded, treated, and bonded before they are packed under the hood of every Ford Focus car produced in Ford's German manufacturing facility. What inventive recycling!⁵

Although performance reports will vary in format depending on the type of responsibility center, they share some common themes. For example, all responsibility center reports compare a center's actual results to its budgeted figures and focus on the differences. Frequently, comparisons are made to a flexible budget as well as to the master budget. Only the items controllable by the manager are included in the performance report. Nonfinancial measures are also examined to achieve a more balanced view of the manager's responsibilities.

Evaluating Investment Center Performance

OBJECTIVE

5 Use the traditional performance measures of return on investment and residual income to evaluate investment centers

The performance evaluation of an investment center must do more than compare controllable revenues and costs with budgeted amounts. Because the managers of investment centers also control resources and invest in assets, other performance measures must be used to hold them accountable for revenues, costs, and the capital investments they specifically control. In this section we will focus on how to compute the traditional performance evaluation measures of return on investment and residual income. Later in the chapter we will discuss the relatively new performance measure of economic value added.

RETURN ON INVESTMENT

Traditionally the most common performance measure that takes into account both operating income and the assets invested to earn that income is **return on investment (ROI)**. Return on investment is computed as follows:

$$\text{Return on Investment (ROI)} = \frac{\text{Operating Income}}{\text{Assets Invested}}$$

In this formula, assets invested is the average of the beginning and ending asset balances for the period.

Of course, properly measuring the income and the assets specifically controlled by a manager is critical to the quality of this performance measure. Using ROI, it is possible to evaluate the manager of any investment center, whether it is an entire company or a unit within a company, such as a subsidiary, division, or other business segment. For example, assume that the Café Cubano Restaurant Division had actual operating income of \$610 and that the average assets invested were \$800. The master budget called for \$890 in operating income and \$1,000 in invested assets. As shown in Exhibit 4, the budgeted ROI for Consuelo Jorge, the president of the division, would be 89 percent, and the actual ROI would be 76 percent. The actual ROI was lower than the budgeted ROI because the division's actual operating income was lower than expected relative to the actual assets invested.

For investment centers, the ROI computation is really the aggregate measure of many interrelationships. The basic ROI equation of Operating Income ÷ Assets Invested can be rewritten to show the many elements a manager can influence within the aggregate ROI number. Two important indicators of performance are profit margin and asset turnover. **Profit margin** is the ratio of operating income to sales; it represents the percentage of each sales dollar that results in profit. **Asset turnover** is the ratio of sales to average assets invested; it indicates the productivity

Exhibit 4**Performance Report Based on
Return on Investment for the Café
Cubano Restaurant Division**

	Master Budget	Actual Results	Variance
Operating income	\$ 890	\$610	\$280 (U)
Assets invested	\$1,000	\$800	\$200 (F)
Performance measure			
ROI	89%	76%	13% (U)
ROI = Operating Income ÷ Assets Invested			
	\$890 ÷ \$1,000 = .89 = 89%		
	\$610 ÷ \$800 = .76 = 76%		

of assets, or the number of sales dollars generated by each dollar invested in assets. Return on investment is equal to profit margin multiplied by asset turnover:

$$\text{ROI} = \text{Profit Margin} \times \text{Asset Turnover}$$

or

$$\text{ROI} = \frac{\text{Operating Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets Invested}} = \frac{\text{Operating Income}}{\text{Assets Invested}}$$

Profit margin and asset turnover help to explain changes in ROI for a single investment center or differences of ROI among investment centers. Therefore, the formula $\text{ROI} = \text{Profit Margin} \times \text{Asset Turnover}$ is useful for analyzing and interpreting the elements that make up a business's overall return on investment.

DuPont, one of the first organizations to recognize the many interrelationships that affect ROI, designed a formula similar to the one diagrammed in Figure 4. You can see that ROI is affected by a manager's decisions about pricing, product sales mix, capital budgeting for new facilities, product sales volume, and other financial matters. In essence, a single ROI number is a composite index of many cause-and-effect relationships and interdependent financial elements. A manager can improve ROI by increasing sales, decreasing costs, or decreasing assets.

Because of the many factors that affect return on investment, management should use this measure cautiously in evaluating performance. If ROI is overemphasized, investment center managers may react with business decisions that favor their personal ROI performance at the expense of companywide profits or the long-term success of other investment centers. To avoid such problems, other performance measures should always be used in conjunction with ROI. Possibilities include comparisons of revenues, costs, and operating income with budget amounts or past trends; sales growth percentages; market share percentages; or other key variables in the organization's activity. ROI should also be compared with budgeted goals and with past ROI trends because changes in this ratio over time can be more revealing than any single number.

RESIDUAL INCOME

Because of the pitfalls of using ROI as a performance measure, other approaches to evaluating investment centers have evolved. For example, companies such as General Motors, General Electric, Coca-Cola, and UPS now use residual income to measure performance. **Residual income (RI)** is the operating income that an investment center earns above a minimum desired return on invested assets. Residual income is not a ratio, but a dollar amount. It is the amount of profit left after subtracting a predetermined desired income target for an investment center. The formula for computing the residual income of an investment center is as follows:

$$\text{Residual Income} = \text{Operating Income} - (\text{Desired ROI} \times \text{Assets Invested})$$

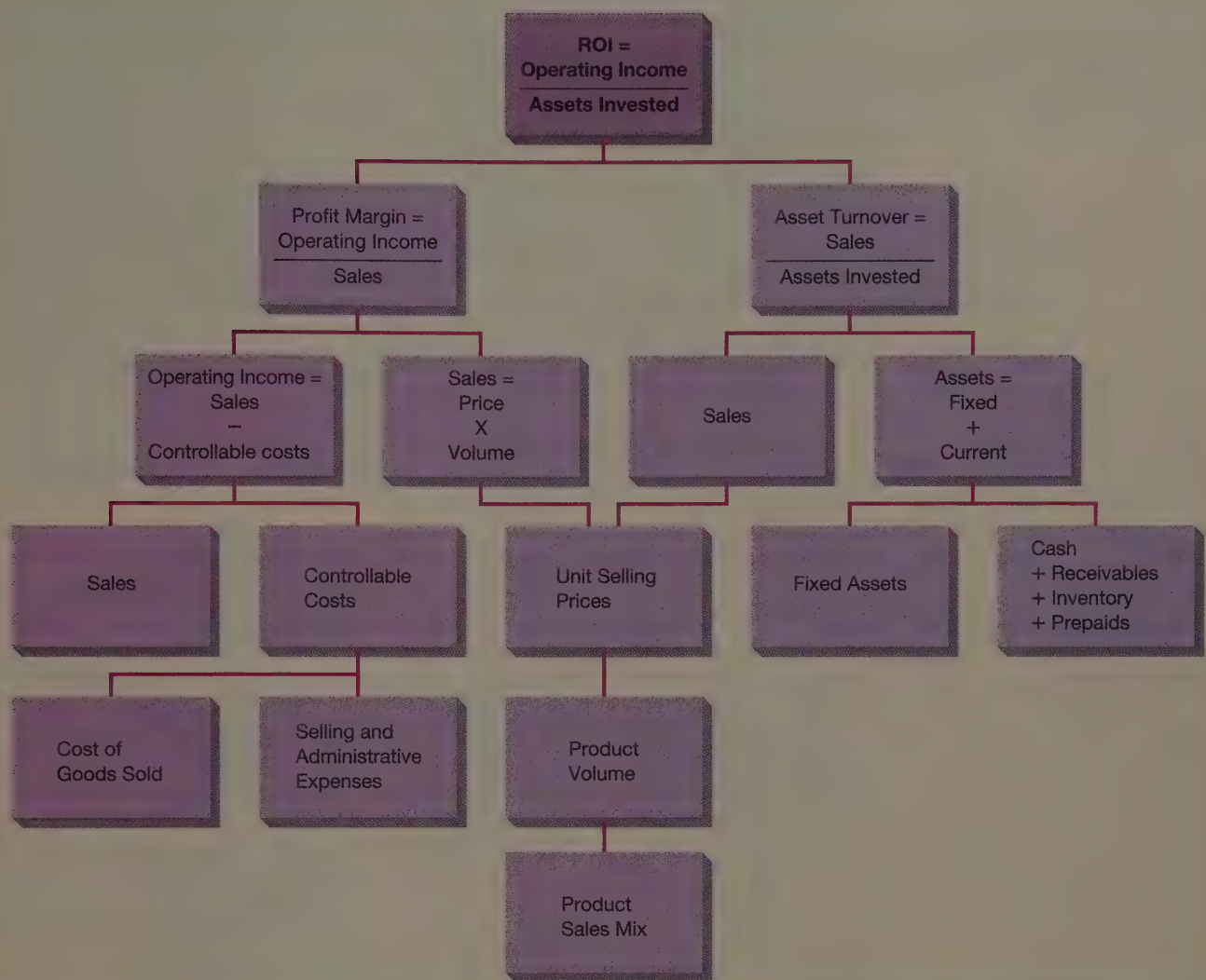


Figure 4
Factors That Affect the Return
on Investment Calculation

As in the computation of ROI, assets invested is the average of the center's beginning and ending asset balances for the period.

The desired RI will vary from investment center to investment center depending on the type of business and the level of risk assumed. The performance report based on residual income for Consuelo Jorge, the president of the Café Cubano Restaurant Division, is shown in Exhibit 5. Assume that the president's residual income performance target is to exceed a 20 percent return on assets invested in the division. Note that the division's residual income is \$450, which was lower than the \$690 projected in the master budget.

Comparisons with other residual income figures will strengthen the analysis. To add context to the analysis of the division and its manager, questions such as the following need to be answered: How did the division's residual income for this year compare to those of previous years? Did the actual residual income exceed the budgeted residual income? How did this division's residual income compare with amounts generated by other investment centers of the company?

Caution is called for when using residual income to compare investment centers within a company. For their residual income figures to be comparable, all investment centers must have equal access to resources and similar asset investment

Exhibit 5**Performance Report Based on Residual Income for the Café Cubano Restaurant Division**

	Master Budget	Actual Results	Variance
Operating income	\$ 890	\$610	\$280 (U)
Assets invested	\$1,000	\$800	\$200 (F)
Desired ROI	20%		
Performance measures			
ROI	89%	76%	13% (U)
Residual income	\$ 690	\$450	\$240 (U)
Residual Income = Operating Income – (Desired ROI × Assets Invested)			
	\$890 – 20%(\$1,000) = \$690		
	\$610 – 20%(\$800) = \$450		

bases. Some managers may be able to produce larger residual incomes simply because their investment centers are larger rather than because their performance is better. Like ROI, RI has some flaws.

OBJECTIVE

6 Use economic value added to evaluate investment centers



ECONOMIC VALUE ADDED Recently, more and more businesses have been using the shareholder wealth created by an investment center, or the **economic value added (EVA)**, as an indicator of performance. The calculation of EVA, a registered trademark of the consulting firm Stern Stewart & Company, can be quite complex because it makes various cost of capital and accounting principles adjustments. You will learn more about the cost of capital in the chapter that discusses capital investment decisions. However, for the purposes of computing EVA, the **cost of capital** is the minimum desired rate of return on an investment, such as assets invested in an investment center.

Basically, the computation of economic value added is similar to the computation of residual income, except that after-tax operating income is used instead of pretax operating income, and a cost of capital percentage is multiplied by the center's invested assets less current liabilities instead of a desired ROI percentage being multiplied by invested assets. Also, like residual income, the economic value added is expressed in dollars. Simply put, the formula is

$$\text{Economic Value Added} = \text{After-Tax Operating Income} - \text{Cost of Capital in Dollars}$$

or

$$\text{Economic Value Added} = \text{After-Tax Operating Income} - [\text{Cost of Capital} \times (\text{Total Assets} - \text{Current Liabilities})]$$

A very basic computation of economic value added for Consuelo Jorges, the president of the Café Cubano Restaurant Division, is shown in Exhibit 6. The

Exhibit 6**Performance Report Based on Economic Value Added for the Café Cubano Restaurant Division**

	Master Budget	Actual Results	Variance
Performance measures			
ROI	89%	76%	13% (U)
Residual income	\$690	\$450	\$240 (U)
Economic value added		\$334	
Economic Value Added = After-Tax Operating Income – [Cost of Capital × (Total Assets – Current Liabilities)]			
	\$400 – 12%(\$800 – \$250) = \$334		

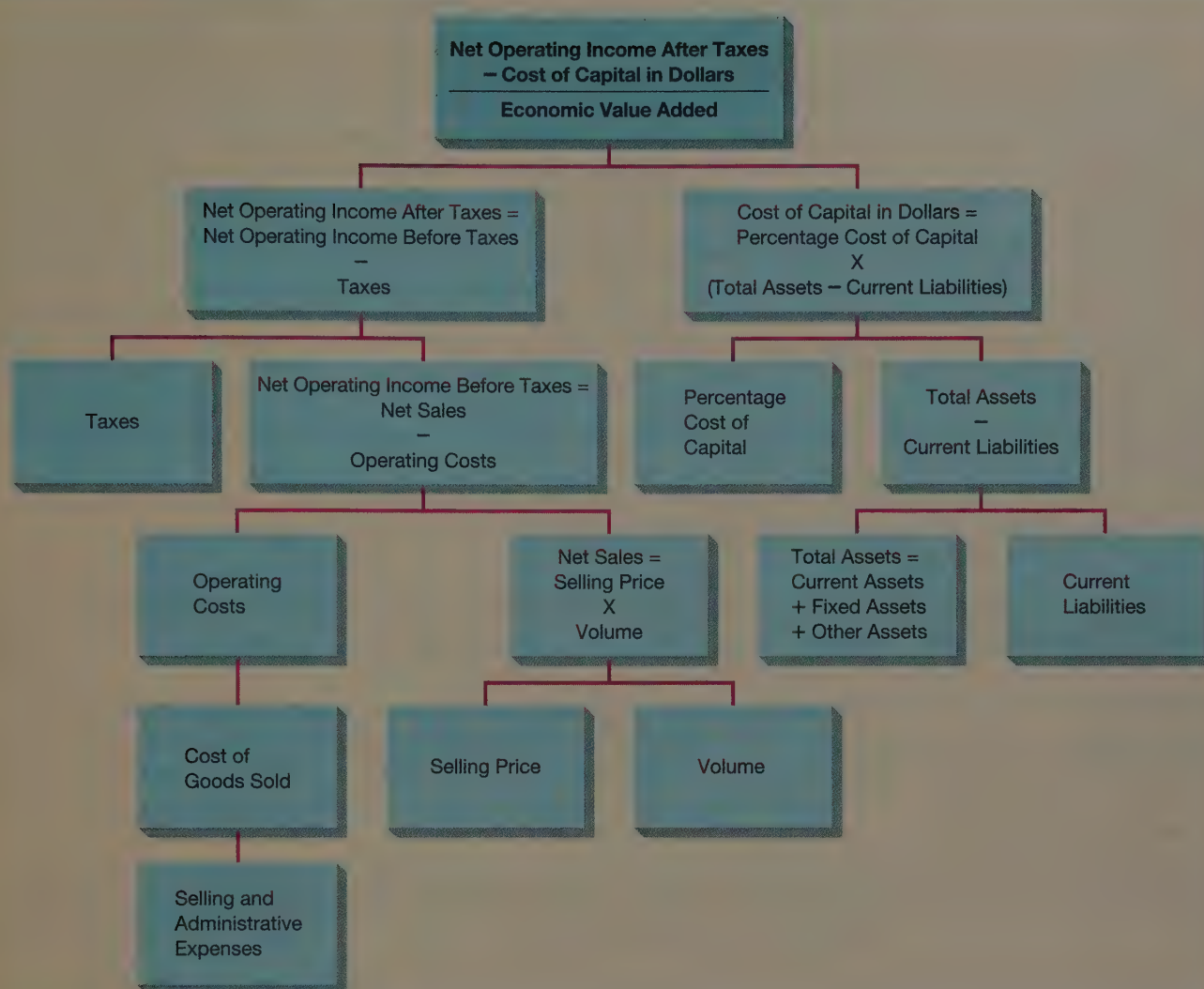


Figure 5
Factors Affecting the
Computation of Economic
Value Added

report assumes that the division's after-tax operating income is \$400, its total assets are \$800, its current liabilities are \$250, and the cost of capital is 12 percent.

The report shows that the division has added \$334 to its economic value after taxes and cost of capital. In other words, the division produced after-tax profits of \$334 in excess of the cost of capital required to generate those profits.

Because many factors affect the economic value of an investment center, management should be cautious when drawing conclusions about performance. The evaluation will be more meaningful if the current EVA is compared to EVAs from previous periods, target EVAs, and EVAs from other investment centers.

The factors that affect the computation of economic value added are illustrated in Figure 5. An investment center's economic value is affected by managers' decisions on pricing, product sales volume, taxes, cost of capital, capital investments, and other financial decisions. In essence, the economic value added number is a composite index drawn from many cause-and-effect relationships and interdependent financial elements. A manager can improve the economic value of an investment center by increasing sales, decreasing costs, decreasing assets, or lowering the cost of capital.

The Importance of Multiple Performance Measures

In summary, to be effective, a performance management system must consider both operating results and multiple performance measures, such as return on investment, residual income, and economic value added. Comparing actual results to budgeted figures adds meaning to the evaluation. Performance measures such as ROI, RI, and EVA indicate whether an investment center is effective in coordinating its own goals with companywide goals because those measures take into account both operating income and the assets used to produce that income. However, all three measures are limited by their focus on short-term financial performance. To obtain a fuller picture, management needs to break these three measures down into their components, analyze such information as responsibility center income over time, and compare current results to the targeted amounts in the flexible or master budgets. In addition, the analysis of such nonfinancial performance indicators as average throughput time, employee turnover, and number of orders processed will ensure a more balanced view of a business's well-being and how to improve it.

Performance Incentives

OBJECTIVE
7 Explain how properly linked performance incentives and measures add value for all stakeholders in performance management and evaluation

The effectiveness of a performance management and evaluation system depends on how well it coordinates the goals of responsibility centers, managers, and the entire company. Two factors are key to the successful coordination of goals: the logical linking of goals to measurable objectives and targets, and the tying of appropriate compensation incentives to the achievement of the targets.

Linking Goals, Objectives, Measures, and Performance Targets



The causal links between an organization's goals, performance objectives, measures, and targets must be apparent. For example, if a company seeks to be a friend of the environment, as do Bristol-Myers Squibb and Royal Dutch/Shell,⁶ it may choose the following linked goal, objective, measure, and performance target:

Goal	Objective	Measure	Performance Target
To be a friend of the environment	To reduce the company's environmental risk	Number of products recycled	To recycle at least 10 percent of products sold

You may recall that the balanced scorecard also links objectives, measures, and targets, as shown in Figure 1 earlier in this chapter.

Performance-Based Pay

The tying of appropriate compensation incentives to performance targets increases the likelihood that the goals of responsibility centers, managers, and the entire organization will be well coordinated. Unfortunately, this linkage does not always happen. A 1999 survey done by AnswerThink reported that only 58 percent of companies link bonuses, merit pay increases, and profit sharing to the measurable performance of strategic and tactical plans.⁷ Responsibility center managers are more likely to achieve their performance targets if their compensation depends on it. **Performance-based pay** is the linking of employee compensation to the achievement of measurable business targets. For example, at DaimlerChrysler all



132,000 German factory employees are eligible for some type of performance-based pay, such as cash bonuses, profit sharing, or stock options.⁸

Cash bonuses, awards, profit-sharing plans, and stock option programs are common types of incentive compensation. Cash bonuses are usually given to reward an individual's short-term performance. A bonus may be stated as a fixed dollar amount or as a percentage of a target figure, such as 5 percent of operating income or 10 percent of the dollar increase in operating income. An award may be a trip or some other form of recognition for desirable individual or group performance. For example, many companies sponsor a trip for all managers who have met their performance targets during a specified period. Other companies award incentive points that may be redeemed for goods or services. (Notice that awards can be used to encourage both short-term and long-term performance.) Profit-sharing plans reward employees with a share of the company's profits. Employees often receive company stock as recognition of their contribution to a profitable period. Using stock as a reward encourages employees to think and act as investors as well as employees and encourages a stable work force. In other words, in terms of the balanced scorecard, they assume two stakeholder perspectives and take both a short- and a long-term viewpoint. Stock options give individual employees the right to purchase a certain number of shares at a specific price within a certain period. Companies use stock options to motivate employees to achieve financial targets that increase the company's stock price. Managers like stock options because the options enable them to realize a profit if the actual stock price rises above their granted option price. Stock options usually have specific performance requirements attached to them. Because many of the variables that affect stock price are beyond a manager's control, stock options may not be the best way to promote the coordination of goals.

The Coordination of Goals

What performance incentives and measures should a company use to manage and evaluate performance? What actions and behaviors should an organization reward? Which incentive compensation plans work best? The answers to such questions depend on the facts and circumstances of each organization. What promotes the coordination of goals for one organization may not do so for another. To be effective, incentive plans must be developed with input from all employees. All must understand the causal links between goals, objectives, measures, and performance targets. To determine the right performance incentives for their organization, employees and managers must answer several questions:

- When should the reward occur? Will we give the reward now or sometime in the future?
- Whose performance should be rewarded? Will we reward the performance of responsibility centers, of individual managers, or of the entire company?
- How should the reward be computed?
- On what should the reward be based?
- What performance criteria should be used?
- Does our performance incentive plan address the interests of all our stakeholders?

The effectiveness of a performance management and evaluation system relies on the coordination of responsibility center, managerial, and company goals. Performance can be optimized by linking goals to measurable objectives and targets

and by tying appropriate compensation incentives to the achievement of the targets. Common types of incentive compensation include cash bonuses, awards, profit-sharing plans, and stock option programs. Each organization's unique circumstances will determine its correct mix of measures and compensation incentives. If management values the perspectives of all of its stakeholder groups, its performance management and evaluation system will balance and benefit all interests.

Chapter Review

REVIEW OF LEARNING OBJECTIVES



↑
Check out ACE, a self-quizzing
program on chapter content,
at <http://college.hmco.com>.

- 1. Describe how the balanced scorecard aligns performance with organizational goals and explain the balanced scorecard's role in the management cycle.** The balanced scorecard is a framework that links the perspectives of an organization's four basic stakeholder groups—financial (investors), learning and growth (employees), internal business processes, and customers—with the organization's mission and vision, performance measures, strategic plan, and resources. Ideally, managers should be able to see how their actions contribute to the achievement of organizational goals and understand how their compensation is linked to their actions. The balanced scorecard assumes that an organization will get what it measures.
- 2. Discuss performance measurement and state the issues that affect management's ability to measure performance.** An effective performance measurement system accounts for and reports on both financial and nonfinancial performance so that an organization can ascertain how well it is doing, where it is going, and what improvements will make it more profitable. Each organization must develop a unique set of performance measures appropriate to its specific situation. In addition to answering basic questions about what to measure and how to measure, management must consider a variety of other issues. Managers must collaborate with other managers to develop a group of measures, such as the balanced scorecard, that will help managers determine what needs to be done to improve performance.
- 3. Define responsibility accounting and describe the role responsibility centers play in performance management and evaluation.** Responsibility accounting is an information system that classifies data according to areas of responsibility and reports each area's activities by including only the revenue, cost, and resource categories that the assigned manager can control. There are five types of responsibility centers: cost centers, discretionary cost centers, revenue centers, profit centers, and investment centers. Performance reporting by responsibility center allows the source of a cost, revenue, or resource to be traced to the manager who controls it and thus makes it easier to evaluate a manager's performance.
- 4. Prepare performance reports for the various types of responsibility centers, including reports based on flexible budgets for cost centers and variable costing for profit centers.** Performance reports contain information about costs, revenues, and resources that are controllable by individual managers. The content and format of a performance report depend on the nature of the responsibility center. The performance of a cost center may be evaluated by comparing its actual costs with the corresponding amounts in the

flexible and master budgets. A flexible budget is derived by multiplying actual unit output by predetermined standard unit costs for each cost item in the report. The resulting variances between actual costs and the flexible budget can be examined further by using standard costing to compute specific variances for direct materials, direct labor, and manufacturing overhead. A profit center's performance is usually evaluated by comparing its actual income statement results to its budgeted income statement. When variable costing is used, the profit center manager's controllable costs are classified as either variable or fixed. The resulting performance report takes the form of a contribution income statement instead of a traditional income statement. The variable costing income statement is useful because it focuses on cost variability and the profit center's contribution to operating income.

5. **Use the traditional performance measures of return on investment and residual income to evaluate investment centers.** Traditionally, the most common measure of performance is return on investment (ROI). The basic formula for this performance measure is $ROI = \text{Operating Income} \div \text{Assets Invested}$. Return on investment may also be examined in terms of profit margin and asset turnover. In that case, $ROI = \text{Profit Margin} \times \text{Asset Turnover}$, where $\text{Profit Margin} = \text{Operating Income} \div \text{Sales}$ and $\text{Asset Turnover} = \text{Sales} \div \text{Assets Invested}$. Residual income (RI) is the operating income that an investment center earns above a minimum desired return on invested assets. Residual income is expressed as a dollar amount: $\text{Residual Income} = \text{Operating Income} - (\text{Desired ROI} \times \text{Assets Invested})$. It is the amount of profit left after subtracting a predetermined desired income target for an investment center.
6. **Use economic value added to evaluate investment centers.** Economic value added (EVA) measures the shareholder wealth created by an investment center. The calculation of economic value added can be quite complex because it is a composite of many cause-and-effect relationships and interdependent financial elements. Basically, the concept of economic value added is similar to residual income. $\text{Economic Value Added} = \text{After-Tax Operating Income} - \text{Cost of Capital}$ (expressed in dollars). A manager can improve the economic value of an investment center by increasing sales, decreasing costs, decreasing assets, or lowering the cost of capital.
7. **Explain how properly linked performance incentives and measures add value for all stakeholders in performance management and evaluation.** The effectiveness of a performance management and evaluation system depends on how well it coordinates the goals of responsibility centers, managers, and the entire company. Performance can be optimized by linking goals to measurable objectives and targets and by tying appropriate compensation incentives to the achievement of those targets. Common types of incentive compensation include cash bonuses, awards, profit-sharing plans, and stock option programs. Each organization's unique circumstances will determine its correct mix of measures and compensation incentives. If management values the perspectives of all of its stakeholder groups, its performance management and evaluation system will balance and benefit all interests.

REVIEW OF CONCEPTS AND TERMINOLOGY

LO 5

The following concepts and terms were introduced in this chapter:

Asset turnover: The productivity of assets, or the number of sales dollars generated by each dollar invested in assets; $\text{Sales} \div \text{Assets Invested}$.

LO 1

Balanced scorecard: A framework that links the perspectives of an organization's four basic stakeholder groups—financial (investors), learning and growth (employees),

internal business processes, and customers—with the organization's mission and vision, performance measures, strategic plan, and resources.

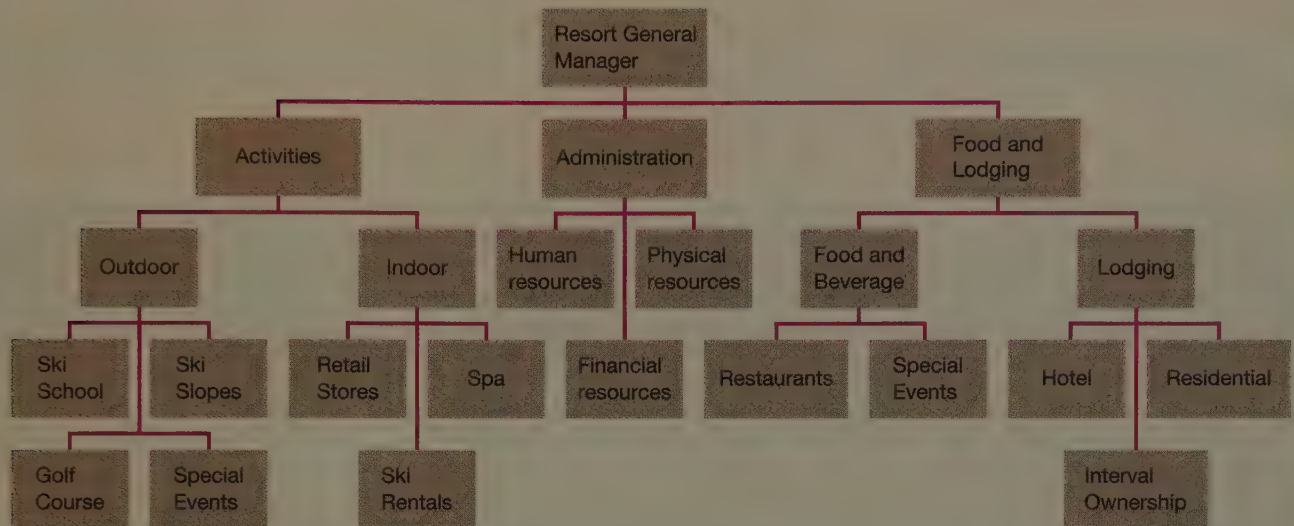
- L03 Controllable costs and revenues:** Costs and revenues that result from a manager's actions, influence, or decisions.
- L03 Cost center:** A responsibility center whose manager is accountable for only controllable costs that have well-defined relationships between the center's resources and products or services.
- L06 Cost of capital:** The minimum desired rate of return on an investment, such as assets invested in an investment center.
- L03 Discretionary cost center:** A responsibility center whose manager is accountable for costs only and in which the relationship between resources and products or services produced is not well defined.
- L06 Economic value added (EVA):** The shareholder wealth created by an investment center; $\text{Economic Value Added} = \text{After-Tax Operating Income} - \text{Cost of Capital in Dollars}$.
- L03 Investment center:** A responsibility center whose manager is accountable for profit generation and can also make significant decisions about the resources the center uses.
- L03 Organization chart:** A visual representation of an organization's hierarchy of responsibility for the purposes of management control.
- L07 Performance-based pay:** The linking of employee compensation to the achievement of measurable business targets.
- L02 Performance management and evaluation system:** A set of procedures that account for and report on both financial and nonfinancial performance, so that a company can identify how well it is doing, where it is going, and what improvements will make it more profitable.
- L02 Performance measurement:** The use of quantitative tools to gauge an organization's performance in relation to a specific goal or an expected outcome.
- L03 Profit center:** A responsibility center whose manager is accountable for both revenue and costs and for the resulting operating income.
- L05 Profit margin:** The percentage of each sales dollar that results in profit; $\text{Profit Margin} = \text{Operating Income} \div \text{Sales}$.
- L05 Residual income (RI):** The operating income that an investment center earns above a minimum desired return on invested assets; $\text{Residual Income} = \text{Investment Center's Operating Income} - (\text{Desired ROI} \times \text{Assets Invested})$.
- L03 Responsibility accounting:** An information system that classifies data according to areas of responsibility and reports each area's activities by including only the revenue, cost, and resource categories that the assigned manager can control.
- L03 Responsibility center:** An organizational unit whose manager has been assigned the responsibility of managing a portion of the organization's resources. The five most common forms of responsibility center are cost centers, discretionary cost centers, revenue centers, profit centers, and investment centers.
- L05 Return on investment (ROI):** A traditional performance measure that takes into account both operating income and the assets invested to produce that income; $\text{ROI} = \text{Operating Income} \div \text{Assets Invested}$. ROI can also be expressed as $\text{Profit Margin} \times \text{Asset Turnover}$.
- L03 Revenue center:** A responsibility center whose manager is accountable primarily for revenue and whose success is based on its ability to generate revenue.
- L04 Variable costing:** A method of preparing profit center performance reports that classifies a manager's controllable costs as either fixed or variable and produces a contribution income statement.

REVIEW PROBLEM

LO 3
LO 4
LO 5

Evaluating Profit Center and Investment Center Performance

Winter Wonderland is a full-service resort and spa. Mary Fortenberry, the resort's general manager, is responsible for guest activities, administration, and food and lodging. In addition, she is solely responsible for the resort's capital investments. The organization chart below shows the resort's various activities and the levels of authority Fortenberry has established.



Three divisional managers receive compensation based on their division's performance and have authority to make employee compensation decisions for their division. Alexandra Patel manages the Food and Lodging Division, which had the following master budget and actual results for the year ended June 30, 20x4.

Winter Wonderland Food and Lodging Division For the Year Ended June 30, 20x4

	Master Budget	Actual Results
Guest days	4,000	4,100
Sales (in thousands)	\$38,000	\$40,000
Variable cost of sales	24,000	25,000
Variable selling and administrative expenses	4,000	4,250
Fixed selling and administrative expenses	2,500	2,500
Fixed cost of sales	2,000	1,800

REQUIRED

1. What types of responsibility centers are Administration, Food and Lodging, and Resort General Manager?
2. Assume that Food and Lodging is a profit center. Prepare a performance report using variable costing and flexible budgeting. Determine the variances between actual results and the corresponding figures in the flexible budget and the master budget.
3. Assume that the divisional managers have been assigned responsibility for capital expenditures and that their divisions are thus investment centers. Food and Lodging

is expected to generate a desired ROI of at least 30 percent on average assets invested of \$10,000,000.

- a. Compute the division's return on investment and residual income using the average assets invested in both the actual and the budget calculations.
 - b. Using the ROI and residual income, evaluate Alexandra Patel's performance as divisional manager.
4. Compute the division's actual economic value added if the division's assets are \$12,000,000, current liabilities are \$3,000,000, after-tax operating income is \$4,500,000, and the cost of capital is 20 percent.

ANSWER TO REVIEW PROBLEM

1. Administration: discretionary cost center; Food and Lodging: profit center; Resort General Manager: investment center.
2. Performance report:

**Winter Wonderland
Food and Lodging Division
For the Year Ended June 30, 20x4
(Dollar amounts in thousands)**

	Actual Results	Variance	Flexible Budget	Variance	Master Budget
Guest days	4,100	0	4,100	100 (F)	4,000
Sales (in thousands)	\$40,000.00	\$1,050.00 (F)	\$38,950.00	\$ 950.00 (F)	\$38,000.00
Controllable variable costs					
Variable cost of sales	25,000.00	400.00 (U)	24,600.00	600.00 (U)	24,000.00
Variable selling and administrative expenses	4,250.00	150.00 (U)	4,100.00	100.00 (U)	4,000.00
Contribution margin	\$10,750.00	\$ 500.00 (F)	\$10,250.00	\$ 250.00 (F)	\$10,000.00
Controllable fixed costs					
Fixed selling and administrative expenses	2,500.00	0	2,500.00	0	2,500.00
Fixed cost of sales	1,800.00	200.00 (F)	2,000.00	0	2,000.00
Division operating income	<u>\$ 6,450.00</u>	<u>\$ 700.00 (F)</u>	<u>\$ 5,750.00</u>	<u>\$250.00 (F)</u>	<u>\$ 5,500.00</u>

3. a. **Return on investment**

Actual results: $\$6,450,000 \div \$10,000,000 = 64.50\%$

Flexible budget: $\$5,750,000 \div \$10,000,000 = 57.50\%$

Master budget: $\$5,500,000 \div \$10,000,000 = 55.00\%$

Residual income

Actual results: $\$6,450,000 - 30\%(\$10,000,000) = \$3,450,000$

Flexible budget: $\$5,750,000 - 30\%(\$10,000,000) = \$2,750,000$

Master budget: $\$5,500,000 - 30\%(\$10,000,000) = \$2,500,000$

- b. Alexandra Patel's performance as the divisional manager of Food and Lodging exceeds company performance expectations. Actual ROI was 64.5 percent, whereas the company expected an ROI of 30 percent and the flexible budget and the master budget showed projections of 57.50 percent and 55 percent, respectively. Residual income also exceeded expectations. The Food and Lodging Division generated \$3,450,000 in residual income when the flexible budget and master budget had projected RIs of \$2,750,000 and \$2,500,000. The performance report for the division shows 100 more guest days than had been anticipated and a favorable controllable fixed cost variance. As a manager, Patel will investigate the unfavorable variances associated with her controllable variable costs.
4. **Economic value added:**

$$\$4,500,000 - 20\%(\$12,000,000 - \$3,000,000) = \$2,700,000$$

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

1. What four basic stakeholder groups are included in the balanced scorecard?
2. In the planning stage of the management cycle, once performance objectives are set, what do managers do?
3. Why is it important for managers to see the causal relationships between their actions and the company's overall performance?
4. How does the balanced scorecard add dimension to the management cycle?
5. What is a performance management and evaluation system?
6. Define responsibility accounting.
7. Describe a responsibility center.
8. What is the difference between a cost center and a discretionary cost center?
9. What is a revenue center?
10. Compare and contrast a cost center, a profit center, and an investment center.
11. What is the role of a responsibility accounting system in an organization?
12. How does a company's organizational structure affect its responsibility accounting system?
13. What types of information are contained in performance reports?
14. What types of comparisons are contained in a performance report for a cost center?
15. Why is a contribution income statement useful in performance management and evaluation?
16. What are some similarities between the performance reports for the various kinds of responsibility centers?
17. Why is return on investment more than a ratio of two numbers?
18. How does residual income differ from return on investment?
19. What are the similarities and differences between residual income and economic value added?
20. Why do incentive plans use performance-based pay?

SHORT EXERCISES

- SE 1.** One of your college's overall goals is customer satisfaction. In light of that goal, match each of these stakeholders' perspectives with the appropriate objective:

LO 1 Balanced Scorecard

Perspective	Objective
1. Financial (investors)	a. Customer satisfaction means that the faculty engages in cutting-edge research.
2. Learning and growth (employees)	b. Customer satisfaction means that students receive their degrees in four years.
3. Internal business processes	c. Customer satisfaction means that the college has a winning athletics program.
4. Customers	d. Customer satisfaction means that fund-raising campaigns are successful.

- SE 2.** Identify each of the following as a cost center, a discretionary cost center, a revenue center, a profit center, or an investment center.

LO 3 Responsibility Centers

1. The manager of center A is responsible for generating cash inflows and incurring costs with the goal of making money for the company. The manager has no responsibility for assets.
2. Center B produces a product that is not sold to an external party.
3. The manager of center C is responsible for the telephone order operations of a large retailer.

4. Center D designs, produces, and sells products to external parties. The manager makes both long-term and short-term decisions.
5. Center E provides human resource support for the other centers in the company.

LO 3 Controllable Costs

SE 3. Sam Rittorno is the manager of the Paper Cutting Department in the Northwest Division of Williams Paper Products. Identify each of the following costs as either controllable or not controllable by Rittorno.

1. Salaries of cutting machine workers
2. Cost of cutting machine parts
3. Cost of electricity for the Northwest Division
4. Lumber Department hauling costs
5. Vice president's salary

LO 4 Cost Center Performance Report

SE 4. Complete the following performance report for cost center C for the month ended December 31, 20x4.

	Actual Results	Variance	Flexible Budget	Variance	Master Budget
Units produced	80	0	?	20 (U)	100
Center costs					
Direct materials	\$ 84	\$?	\$ 80	\$?	\$100
Direct labor	150	?	?	40 (F)	200
Variable overhead	?	20 (U)	240	?	300
Fixed overhead	280	?	250	?	250
Total cost	<u>\$?</u>	<u>\$44 (U)</u>	<u>\$?</u>	<u>\$120 (F)</u>	<u>\$850</u>
Performance measures					
Defect-free units to total produced	75%	?	N/A		90%
Average throughput time per unit	12 minutes	?	N/A		10 minutes

LO 4 Profit Center Performance Report

SE 5. Complete the following performance report for profit center P for the month ended December 31, 20x4.

	Master Budget	Actual Costs	Variance
Sales	\$120	?	\$ 20 (F)
Controllable variable costs			
Variable cost of goods sold	?	25	10 (U)
Variable selling and administrative expenses	5	15	?
Contribution margin	<u>\$100</u>	<u>\$100</u>	<u>\$?</u>
Controllable fixed costs	60	?	10 (F)
Profit center income	<u>?</u>	<u>\$ 50</u>	<u>\$ 10 (F)</u>
Performance measures			
Number of orders processed	?	50	20 (F)
Average daily sales	\$4.00	?	.66 (F)
Number of units sold	?	100	40 (F)

LO 5 Return on Investment

SE 6. Complete the return on investment, gross margin, and asset turnover calculations for investment centers D and V:

	Subsidiary D	Subsidiary V
Total sales	\$1,650	\$2,840
Operating income	\$ 180	\$ 210
Average assets invested	\$ 940	\$1,250
Profit margin	?	7.39%
Asset turnover	1.76 times	?
ROI	?	?

- SE 7.** Complete the return on investment, profit margin, asset turnover, and average assets invested calculations for investment centers J and K:

LO 5 Return on Investment

	Subsidiary J	Subsidiary K
Total sales	\$2,000	\$2,000
Operating income	\$ 500	\$ 800
Beginning assets invested	\$4,000	\$ 500
Ending assets invested	\$6,000	\$1,500
Average assets invested	?	?
Profit margin	25%	?
Asset turnover	?	2 times
ROI	?	?

- SE 8.** Complete the residual income and average assets invested calculations for investment centers H and F:

LO 5 Residual Income

	Subsidiary H	Subsidiary F
Total sales	\$20,000	\$25,000
Operating income	\$ 1,500	?
Beginning assets invested	\$ 4,000	\$ 500
Ending assets invested	\$ 6,000	?
Average assets invested	?	\$ 1,000
Desired ROI	20%	20%
Residual income		\$ 600

- SE 9.** Complete the economic value added calculations for investment centers M and N:

LO 6 Economic Value Added

	Subsidiary M	Subsidiary N
Total sales	\$15,000	\$18,000
After-tax operating income	\$ 1,000	\$ 1,100
Total assets	\$ 4,000	\$ 5,000
Current liabilities	\$ 1,000	?
Total assets – current liabilities	?	\$ 3,500
Cost of capital	15%	15%
Economic value added	?	?

- SE 10.** One of your college's goals is customer satisfaction. In view of that goal, identify each of the following as a linked objective, measure, or performance target.

LO 7 Coordination of Goals

- To have successful fund-raising campaigns
- Number of publications per year per tenure-track faculty
- To increase the average donation by 10 percent
- Average number of dollars raised per donor
- To have faculty engage in cutting-edge research
- To increase the number of publications per faculty member by at least one per year

EXERCISES

- E 1.** Volker Industries is considering adopting the balanced scorecard and has compiled the list of possible performance measures shown on the next page. Select the balanced scorecard perspective that best matches each performance measure.

LO 1 Balanced Scorecard

LO 1

Balanced Scorecard

Performance Measure

Balanced Scorecard Perspective

1. Residual income

a. Financial (investors)

2. Customer satisfaction rating

b. Learning and growth (employees)

3. Employee absentee rate

c. Internal business processes

4. Growth in profits

d. Customers

5. On-time deliveries

6. Manufacturing process time

E 2.

B2B Online Products is considering adopting the balanced scorecard and has compiled the following list of possible performance measures. Select the balanced scorecard perspective that best matches each performance measure.

Performance Measure

Balanced Scorecard Perspective

1. Economic value added

a. Financial (investors)

2. Employee turnover

b. Learning and growth (employees)

3. Average daily sales

c. Internal business processes

4. Defect-free units

d. Customers

5. Number of repeat customer visits

6. Employee training hours

LO 2

Performance Measures

E 3.

Alex Thurmon wants to measure his division’s product quality. Link an appropriate performance measure with each balanced scorecard perspective:

Product Quality

Possible Performance Measures

1. Financial (investors)

a. Number of defective products returned

2. Learning and growth (employees)

b. Number of products failing inspection

3. Internal business processes

c. Increased market share

4. Customers

d. Savings from employee suggestions

LO 2

Performance Measures

E 4.

Thea Montana wants to measure customer satisfaction within her region. Link an appropriate performance measure with each balanced scorecard perspective:

Customer Satisfaction

Possible Performance Measures

1. Financial (investors)

a. Number of cross-trained staff

2. Learning and growth (employees)

b. Customer satisfaction rating

3. Internal business processes

c. Time lapse from order to delivery

4. Customers

d. Dollar sales to repeat customers

LO 3

Responsibility Centers

E 5.

Identify the most appropriate type of responsibility center for each of the following organizational units.

1. A pizza store in a pizza chain

2. The ticket sales center of a major airline

3. The South American segment of a multinational company

4. A subsidiary of a business conglomerate

5. The information technology area of a company

6. A manufacturing department of a large corporation

7. An eye clinic in a community hospital

8. The food-service function at a nursing home

9. The food-preparation plant of a large restaurant chain

10. The catalog order department of a retailer

LO 3

Controllable Costs

E 6.

Sweet Delights produces pies. The company has the following three-tiered manufacturing structure:

Vice President—Production

↑

Plant Manager

↑

Production Supervisors

Identify the manager responsible for each of the following costs.

1. Repair and maintenance costs
2. Materials handling costs
3. Direct labor
4. Supervisors' salaries
5. Maintenance of plant grounds
6. Depreciation, equipment
7. Plant manager's salary
8. Cost of materials used
9. Storage of finished goods
10. Property taxes, plant
11. Depreciation, plant

LO 3 Organization Chart

- E 7.** Hooper Industries wants to formalize its management structure by designing an organization chart. The company has a president, a board of directors, and two vice presidents. Four discretionary cost centers—Financial Resources, Human Resources, Information Resources, and Physical Resources—report to one of the vice presidents. The other vice president has one manufacturing plant with three subassembly areas reporting to her. Draw the company's organization chart.

LO 4 Performance Reports

- E 8.** Jackie Huang, a new employee at Welborne, Inc., is learning about the various types of performance reports. Describe the typical contents of a performance report for each type of responsibility center.

LO 4 Variable Costing Income Statement

- E 9.** Garden, LLC, owns a chain of gourmet vegetarian take-out markets. Last month, Store P generated the following information: sales, \$890,000; direct materials, \$220,000; direct labor, \$97,000; variable overhead, \$150,000; fixed overhead, \$130,000; variable selling and administrative expenses, \$44,500; and fixed selling expenses, \$82,300. There were no beginning or ending inventories. Average daily sales (25 business days) were \$35,600. Customer orders processed totaled 15,000. Garden had budgeted monthly sales of \$900,000; direct materials, \$210,000; direct labor, \$100,000; variable overhead, \$140,000; fixed overhead, \$140,000; variable selling and administrative expenses, \$45,000; and fixed selling expenses, \$85,000. The store had been projected to do \$36,000 in daily sales and process 16,000 customer orders. Using this information, prepare a performance report for Store P.

LO 4 Variable Costing Income Statement

- E 10.** The income statement in the traditional reporting format for Bonsai Products, Inc., for the year ended December 31, 20x3, is as follows.

Bonsai Products, Inc. Income Statement For the Year Ended December 31, 20x3	
Sales	\$296,400
Less Cost of Goods Sold	112,750
Gross Margin	\$183,650
Less Operating Expenses	
Selling Expenses	
Variable	\$ 69,820
Fixed	36,980
Administrative Expenses	27,410
Operating Income	<u>\$ 49,440</u>

Total fixed manufacturing costs for 20x3 were \$16,750. All administrative expenses are considered to be fixed.

Using this information, prepare an income statement for Bonsai Products, Inc., for the year ended December 31, 20x3, using the variable costing format.

LO 4 Performance Report for a Cost Center

- E 11.** Newberry, LLC, owns a blueberry processing plant. Last month, the plant generated the following information: blueberries processed, \$50,000; direct labor, \$10,000; variable overhead, \$12,000; and fixed overhead, \$13,000. There were no beginning or ending inventories. Average daily pounds processed (25 business days) were 2,000. Average rate of processing was 250 pounds per hour. At the beginning of the month, Newberry had budgeted costs of blueberries, \$45,000; direct labor, \$10,000; variable overhead,

\$14,000; and fixed overhead, \$14,000. The plant had been projected to process 2,000 pounds daily at the rate of 240 pounds per hour. Using this information, prepare a performance report for the month for the blueberry processing plant. Include a flexible budget and a computation of variances in your report. Indicate whether the variances are favorable (F) or unfavorable (U) to the performance of the plant.

LO 5 Investment Center Performance

- E 12.** Ocala Associates is evaluating the performance of three divisions: Glenn, Oaks, and Springs. Using the following data, compute the return on investment and residual income for each division, compare the divisions' performance, and comment on the factors that influenced performance.

	Glenn	Oaks	Springs
Sales	\$100,000	\$100,000	\$100,000
Operating income	\$ 10,000	\$ 10,000	\$ 20,000
Assets invested	\$ 25,000	\$ 12,500	\$ 25,000
Desired ROI	40%	40%	40%

LO 6 Economic Value Added

- E 13.** Leesburg, LLP, is evaluating the performance of three divisions: Lake, Sumpter, and Poe. Using the following data, compute the economic value added by each division and comment on each division's performance.

	Lake	Sumpter	Poe
Sales	\$100,000	\$100,000	\$100,000
After-tax operating income	\$ 10,000	\$ 10,000	\$ 20,000
Total assets	\$ 25,000	\$ 12,500	\$ 25,000
Current liabilities	\$ 5,000	\$ 5,000	\$ 5,000
Cost of capital	15%	15%	15%

LO 7 Performance Incentives

- E 14.** Palatka Consulting is advising Graham Industries on the short-term and long-term effectiveness of cash bonuses, awards, profit sharing, and stock options as performance incentives. Prepare a chart identifying each incentive as either long-term or short-term or both.

LO 7 Goal Congruence

- E 15.** Necessary Novelties, Inc., has adopted the balanced scorecard to motivate its managers toward the companywide goal of leading its industry in innovation. Identify the four stakeholder perspectives that would link to the following objectives, measures, and targets.

Perspective	Objective	Measure	Target
	Profitable new products	New product ROI	New product ROI of at least 75%
	Work force with cutting-edge skills	Percentage of employees cross-trained on work-group tasks	100% of work group cross-trained on new tasks within 30 days
	Agile product design and production processes	Time to market (the time between a product idea and its first sales)	Time to market less than one year for 80% of product introductions
	Successful product introductions	New product market share	Capture 80% of new product market within one year

PROBLEMS

- P 1.** Metal Products, LLC, manufactures metal beverage containers for a variety of drinks. One division manufactures soft drink beverage cans for the North American market. The division has two plants that operate 24 hours a day, 365 days a year. The plants are evaluated as cost centers. Small tools and plant supplies are considered variable overhead. Depreciation and rent are considered fixed overhead. The master budget for a plant and the operating results of the two North American plants, East Coast and West Coast, are as follows:

**LO 3 Evaluating Cost
LO 4 Center Performance**



	Master Budget	East Coast	West Coast
Center costs			
Rolled aluminum (\$.01)	\$4,000,000	\$3,492,000	\$5,040,000
Lids (\$.005)	2,000,000	1,980,000	2,016,000
Direct labor (\$.0025)	1,000,000	864,000	1,260,000
Small tools and supplies (\$.0013)	520,000	432,000	588,000
Depreciation and rent	480,000	480,000	480,000
Total cost	<u>\$8,000,000</u>	<u>\$7,248,000</u>	<u>\$9,384,000</u>
Performance measures			
Cans processed per hour	45,662	41,096	47,945
Average daily pounds of scrap metal	5	6	7
Cans processed (in millions)	400	360	420

REQUIRED

1. Prepare a performance report for the East Coast plant. Include a flexible budget and variance analysis.
2. Prepare a performance report for the West Coast plant. Include a flexible budget and variance analysis.
3. Compare the two plants and comment on their performance.

P 2.
**LO 4 Traditional and Variable
Costing Income Statements**


Roofing tile is the major product of the Zygo Corporation. The company had a particularly good year in 20x4, as shown by its operating data. It sold 88,400 cases of tile. Variable cost of goods sold was \$848,640; variable selling expenses were \$132,600; fixed manufacturing overhead was \$166,680; fixed selling expenses were \$152,048; and fixed administrative expenses were \$96,450. Selling price was \$18 per case. There were no partially completed jobs in process at the beginning or at the end of the year. Finished goods inventory had been used up at the end of the previous year.

REQUIRED

1. Prepare the year-end income statement for the Zygo Corporation using the traditional reporting format.
2. Prepare the year-end income statement for the Zygo Corporation using the variable costing format.

P 3.
**LO 3 Evaluating Profit and
LO 4 Investment Center
LO 5 Performance**


Janece Olin, the managing partner of the law firm Olin, Comfort, and Clark, LLP, makes asset acquisition and disposal decisions for the firm. As managing partner, she supervises the partners in charge of the firm's three branch offices. Those partners have authority to make employee compensation decisions. The partners' compensation depends on the profitability of their branch office. Victoria Luna manages the Seminole Branch, which has the following master budget and actual results for 20x4.

	Master Budget	Actual Results
Billed hours	5,000	4,900
Revenue	\$250,000	\$254,800
Controllable variable costs		
Direct labor	120,000	137,200
Variable overhead	40,000	34,300
Contribution margin	\$ 90,000	\$ 83,300
Controllable fixed costs		
Rent	30,000	30,000
Other administrative expenses	45,000	42,000
Branch operating income	<u>\$ 15,000</u>	<u>\$ 11,300</u>

REQUIRED

1. Assume that the Seminole Branch is a profit center. Prepare a performance report that includes a flexible budget. Determine the variances between actual results, the flexible budget, and the master budget.
2. Evaluate Victoria Luna's performance as manager of the Seminole Branch.
3. Assume that the branch managers are assigned responsibility for capital expenditures and that the branches are thus investment centers. Seminole Branch is

expected to generate a desired ROI of at least 30 percent on average invested assets of \$40,000.

- Compute the branch's return on investment and residual income.
- Using the ROI and residual income, evaluate Victoria Luna's performance as branch manager.

- P 4.** The financial results for the past two years for Ornamental Iron, a division of the Iron Foundry Company, follow.

LO 5 Return on Investment
LO 6 and Residual Income



Iron Foundry Company
Ornamental Iron Division
Balance Sheet
For the Years Ended December 31, 20x3 and 20x4

	20x4	20x3
Assets		
Cash	\$ 5,000	\$ 3,000
Accounts Receivable	10,000	8,000
Inventory	30,000	32,000
Other Current Assets	600	600
Fixed Assets	128,300	120,300
Total Operating Assets	<u>\$173,900</u>	<u>\$163,900</u>
Liabilities and Stockholders' Equity		
Current Liabilities	\$ 13,900	\$ 10,000
Long-Term Liabilities	90,000	93,900
Stockholders' Equity	70,000	60,000
Total Liabilities and Stockholders' Equity	<u>\$173,900</u>	<u>\$163,900</u>

Iron Foundry Company
Ornamental Iron Division
Income Statement
For the Years Ended December 31, 20x3 and 20x4

	20x4	20x3
Sales	\$180,000	\$160,000
Cost of Goods Sold	100,000	90,000
Selling and Administrative Expenses	27,500	26,500
Operating Income	\$ 52,500	\$ 43,500
Taxes	17,850	14,790
After-Tax Operating Income	<u>\$ 34,650</u>	<u>\$ 28,710</u>

REQUIRED

- Compute the division's profit margin, asset turnover, and return on investment for 20x4 and 20x3. Beginning total assets for 20x3 were \$157,900. Round to two decimal places.
- The desired return on investment for the division has been set at 12 percent. Compute Ornamental Iron's residual income for 20x4 and 20x3.
- The cost of capital for the division is 8 percent. Compute the division's economic value added for 20x4 and 20x3.

LO 5 Return on Investment
LO 6 and Economic Value Added

- P 5.** The balance sheet for the New Products Division of NuBone Corporation showed invested assets of \$200,000 at the beginning of the year and \$300,000 at the end of the year. During the year, the New Products Division's operating income was \$12,500 on sales of \$500,000.

REQUIRED



1. Compute the division's residual income if the desired ROI is 6 percent.
2. Compute the following performance measures for the division:
 - a. Profit margin
 - b. Asset turnover
 - c. Return on investment
3. Recompute the division's return on investment under each of the following independent assumptions:
 - a. Sales increase from \$500,000 to \$600,000, causing operating income to rise from \$12,500 to \$30,000.
 - b. Invested assets at the beginning of the year are reduced from \$200,000 to \$100,000.
 - c. Operating expenses are reduced, causing operating income to rise from \$12,500 to \$20,000.
4. Compute NuBone's economic value added if total corporate assets are \$500,000, current liabilities are \$80,000, after-tax operating income is \$50,000, and the cost of capital is 8 percent.

ALTERNATE PROBLEMS

LO 4 Traditional and Variable Costing Income Statements



- P 6.** Interior designers often use the deluxe carpet products of Sierra Mills, Inc. The Maricopa blend is the company's top product line. In March 20x5, Sierra produced and sold 174,900 square yards of Maricopa blend. Factory operating data for the month included variable cost of goods sold of \$2,623,500 and fixed manufacturing overhead of \$346,875. Other expenses included variable selling expenses, \$166,155; fixed selling expenses, \$148,665; and fixed general and administrative expenses, \$231,500. Total sales revenue equaled \$3,935,250. All production took place in March, and there was no work in process at month end. Goods are usually shipped when completed.

REQUIRED

1. Prepare the March 20x5 income statement for Sierra Mills, Inc., using the traditional reporting format.
2. Prepare the month-end income statement for Sierra Mills, Inc., using the variable costing format.

LO 3 Return on Investment
LO 4 and Residual Income



- P 7.** Portia Landau is the president of a company that owns six multiplex movie theaters. Portia has delegated decision-making authority to the theater managers for all decisions except those relating to capital expenditures and film selection. The theater managers' compensation depends on the profitability of their theaters. Anne Burgman, the manager of the Highlands Theater, had the following master budget and actual results for the month:

	Master Budget	Actual Results
Tickets sold	120,000	110,000
Revenue—tickets	\$840,000	\$880,000
Revenue—concessions	480,000	330,000
Controllable variable costs		
Concessions	120,000	99,000
Direct labor	420,000	330,000
Variable overhead	540,000	550,000
Contribution margin	\$240,000	\$231,000
Controllable fixed costs		
Rent	55,000	55,000
Other administrative expenses	45,000	50,000
Theater operating income	<u>\$140,000</u>	<u>\$126,000</u>

REQUIRED

1. Assuming that the theaters are profit centers, prepare a performance report for the Highlands Theater. Include a flexible budget. Determine the variances between actual results, the flexible budget, and the master budget.
2. Evaluate Anne Burgman's performance as manager of the Highlands Theater.
3. Assume that the managers are assigned responsibility for capital expenditures and that the theaters are thus investment centers. Highlands Theater is expected to generate a desired ROI of at least 6 percent on average invested assets of \$2,000,000.
 - a. Compute the theater's return on investment and residual income.
 - b. Using the ROI and residual income, evaluate Anne Burgman's performance as manager.

LO 5 Return on Investment
LO 6 and Economic Value Added

- P 8.** Micanopy Company makes replicas of Indian artifacts. The balance sheet for the Arrowhead Division showed that the company had invested assets of \$300,000 at the beginning of the year and \$500,000 at the end of the year. During the year, the Arrowhead Division's operating income was \$80,000 on sales of \$1,200,000.

REQUIRED



1. Compute the Arrowhead Division's residual income if the desired ROI is 20 percent.
2. Compute the following performance measures for the division:
 - a. Profit margin
 - b. Asset turnover
 - c. Return on investment
3. Compute Micanopy Company's economic value added if total corporate assets are \$6,000,000, current liabilities are \$800,000, after-tax operating income is \$750,000, and the cost of capital is 12 percent.

EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

LO 1 Performance Measures
LO 2 and the Balanced Scorecard



- SD 1.** Identify several performance measures for a business located near you and link each measure with a specific stakeholder's perspective from the balanced scorecard. Be sure to select at least one performance measure for each perspective. If you were the manager of the business, how would you set performance targets for each measure? Prepare an e-mail-style report stating the business's name, location, and activities and your linked performance measures and perspectives. Be prepared to discuss your business and performance measures in class.

Group Activity: Have students complete the above assignment by working in groups of four to six, with each group member assuming a different stakeholder perspective (add government and community if you want more than four perspectives). The group



Communication



Critical Thinking



Ethics



Group Activity

Hot Links
to Real Companies

International



Internet



Memo



Spreadsheet

should become familiar with the background of the business and interview the business's manager or accountant. Ask the group to discuss all perspectives and to prepare a report summarizing their findings.

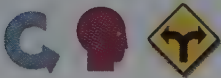
LO 3 Comparison of Business Types Using Responsibility Accounting



- SD 2.** The structure of an organization will affect its responsibility accounting system. *Accenture*, a major management consulting firm, organizes its consultants by industry and location. *Target*, formerly Dayton-Hudson Corporation, has a division for each major retail department store chain it owns: Target, Mervyn's, Marshall Field's, Dayton's, and Hudson's. *Monsanto*, a manufacturer, structures its organization by products: agricultural, pharmaceutical, and nutritional (the latter includes NutraSweet).

What is a responsibility accounting system, what is it based on, and what is the criterion for including an item in a manager's operating report? Discuss the general effects that organizational structure has on the creation of a responsibility reporting system and give an example of a cost center, a profit center, and an investment center at Accenture, Dayton-Hudson Corporation, and Monsanto.

LO 5 Effects of Manager's Decisions on ROI



- SD 3.** Craig Cooper is the manager of the upstate store of a large farm products retailer. His company is a stable, consistently profitable member of the farming industry. The upstate store is doing fine despite severe drought conditions. At the beginning of the year, corporate headquarters set a targeted return on investment for the store of 20 percent. The upstate store currently averages \$140,000 in invested assets (beginning invested assets, \$130,000; ending invested assets, \$150,000) and is projected to have an operating income of \$30,800. Cooper is considering whether to take one or both of the following actions before year end:

- Retain \$5,000 in bills owed by the store in a desk drawer until the start of the next fiscal year.
- Write down \$3,000 in store inventory (nonperishable emergency flood supplies) to zero value because Cooper was unable to sell the items all year.

Currently Cooper's bonus is based on store profits. Next year, corporate headquarters is changing its performance incentive program so that bonuses will be based on a store's actual return on investment.

1. What effect would each of Cooper's possible actions have on the store's operating income this year? (*Hint:* Use Figure 4 to trace the effects.) In your opinion, is either action unethical?
2. Independent of part 1, if corporate headquarters changes its performance incentive plan for store managers, how will the inventory writedown affect next year's income and return on investment if the items are sold for \$4,000 next year? In your opinion, does Cooper have an ethical dilemma?

Research Activity

LO 2 Earnings Management

LO 4
LO 7



- SD 4.** Many large multinational companies have recently taken large one-time write-offs or applied other downsizing or reengineering accounting practices that have affected the measurement of the company's performance in only one year. Conduct a search for the financial statements of a company that has recently taken a sizable reduction in income in just one year. Conduct your search using the Needles Accounting Resource Center web site at <http://college.hmco.com> or do a keyword search using an Internet search engine. Prepare a one-page description of your findings. Include the name of the company, the reason for the large decrease in income, and the probable effect on the company's ROI. Be prepared to present your findings to your classmates.

LO 2 Types of Performance**LO 3 Centers****LO 4****LO 7****Decision-Making Practice**

SD 5. *Aldo's Tortillas* was acquired by *Mesa Foods* several years ago. Aldo's has continued to operate as an independent company, except that Mesa Foods has exclusive authority over capital investments, production quantity, and pricing decisions because Mesa has become Aldo's only customer since the acquisition. Mesa uses return on investment to evaluate the performance of Aldo's manager. The most recent performance report is as follows:

Mesa Foods
Performance Report for Aldo's Tortillas
For the Year Ended June 30, 20x4

Sales	\$6,000
Variable cost of goods sold	\$3,000
Variable administrative expenses	1,000
Variable corporate expenses (% of sales)	600
Contribution margin	\$1,400
Fixed overhead (includes depreciation of \$100)	\$ 400
Fixed administrative expenses	500
Operating income	<u>\$ 500</u>
Average assets invested	<u>\$5,500</u>
Return on investment	9.09%

1. Analyze the items listed in the performance report and identify the items Aldo controls and those Mesa controls. In your opinion, what type of responsibility center is Aldo's Tortillas? Explain your response.
2. Prepare a revised performance report for Aldo's Tortillas and an accompanying memo to the president of Mesa Foods that explains why it is important to change the content of the report. Cite some basic principles of responsibility accounting to support your recommendation.

MANAGERIAL REPORTING AND ANALYSIS**Interpreting Management Reports****MRA 1.****LO 1 Balanced Scorecard Results**

IT, Inc., has adopted the balanced scorecard approach to motivate the managers of its product divisions toward the companywide goal of leading its industry in innovation. The company's selected performance measures and scorecard results were as follows:

Measure	Division			Performance Target
	A	B	C	
New product ROI	80%	75%	70%	75%
Employees cross-trained in new tasks within 30 days	95	96	94	100
New product's time to market less than one year	85	90	86	80
New product's market share one year after introduction	50	100	80	80

Can you effectively compare the performance of three divisions against the targets? What other measures mentioned in this chapter are needed to effectively evaluate performance?

LO 2 Responsibility Centers

LO 3



MRA 2.

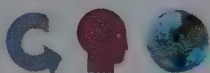
Wood4Fun makes wooden playground equipment for the institutional and consumer markets. The company strives for low-cost, high-quality production because it operates in a highly competitive market in which product price is set by the marketplace and is not based on production costs. The company is organized into responsibility centers. The vice president of manufacturing is responsible for three manufacturing plants. The vice president of sales is responsible for four sales regions. Recently, these two vice presidents began to disagree about whether the manufacturing plants are cost centers or profit centers. The vice president of manufacturing views the plants as cost centers because the managers of the plants control only product-related costs. The vice president of sales believes the plants are profit centers because product quality and product cost strongly affect company profits.

1. Identify the controllable performance Wood4Fun values and wants to measure. Give at least three examples of performance measures Wood4Fun could use to monitor such performance.
2. For the manufacturing plants, what type of responsibility center is most consistent with the controllable performance Wood4Fun wants to measure?
3. For the sales regions, what type of responsibility center is most appropriate?

LO 2 Economic Value Added

LO 6 and Performance

LO 7



MRA 3.

Barcelona Consulting offers environmental consulting services worldwide. The managers of branch offices are rewarded for superior performance with bonuses based on the economic value the office adds to the company. Here are last year's operating results for the entire company and for its three offices, expressed in millions of U.S. dollars.

	Worldwide	Europe	Americas	Asia
Cost of capital	9%	10%	8%	12%
Total assets	\$210	\$70	\$70	\$70
Current liabilities	80	10	40	30
After-tax operating income	15	5	5	5

1. Compute economic value added for each office and worldwide. What factors affect each office's economic value added? How can an office improve its EVA?
2. If managers' bonuses are based on economic value added to office performance, what specific actions will managers be motivated to take?
3. Is economic value added the only performance measure needed to adequately evaluate investment centers? Explain your response.

LO 5 Return on Investment and Residual Income



MRA 4.

Alexandra Patel, the manager of the Food and Lodging Division at Winter Wonderland, has hired you as a consultant to help her examine her division's performance under several different circumstances.

1. Type the following format into a spreadsheet to compute the Food and Lodging Division's actual return on investment and residual income. Match your data entry to the rows and columns shown below. Data are from parts 3 and 4 of this chapter's

Review Problem. (Hint: When entering the formulas, type = in front of the formula in the cell. Then the spreadsheet will know to compute the answer. Remember to format each cell for the type of numbers it holds, such as percentage, currency, or general.)

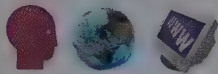
A	B	C	D	E
1				
2	Investment Center		Food and Lodging Division	
3			Actual Results	
4	Sales		\$40,000,000	
5	Operating income		\$ 6,450,000	
6	Average assets invested		\$10,000,000	
7	Desired ROI		30%	
8				
9	Return on Investment		D5/D6	
10				
11	Profit Margin		D5/D4	
12				
13	Asset Turnover		D4/D6	
14				
15	Residual Income		D5-(D7*D6)	
16				

- Patel would like to know how the figures would change if Food and Lodging had a desired ROI of 40 percent and average assets invested of \$10,000,000. Revise your spreadsheet from 1 to compute the division's return on investment and residual income under those conditions.
- Patel also wants to know how the figures would change if Food and Lodging had a desired ROI of 30 percent and average assets invested of \$12,000,000. Revise your spreadsheet from 1 to compute the division's return on investment and residual income under those conditions.
- Does the use of formatted spreadsheets simplify the computation of ROI and residual income? Do such spreadsheets make it easier to do "what-if" analyses?

Internet Case

MBA 5.

LO 7 Top Executive Compensation



Are top executives paid too much? Do the companies run by the most highly paid executives perform better than other companies? Do U.S. executives make more than their foreign counterparts? These are some of the questions asked annually in articles and surveys about executive compensation. Use the Internet to locate the top executive salary rankings compiled annually by business publications and other sources. Study the rankings and select several U.S. and foreign companies in the same industry for comparison.

Hint: There are several ways to access this type of information on the Internet. One approach is to do key word searches using search terms like *executive compensation* or *executive salary survey*. Another approach is to access a business publication web site such as www.forbes.com and do key word searches of their articles. It is also possible to access corporate web sites to view their annual reports. Some corporate sites are even searchable by key word.

- In your review of top executive compensation, what types of incentives did you find included in annual compensation?
- Are the companies with the highest-paid executives the best performers in their industry?
- Do U.S. executives receive higher pay than their foreign counterparts? If so, do the U.S. companies perform better than their foreign counterparts?

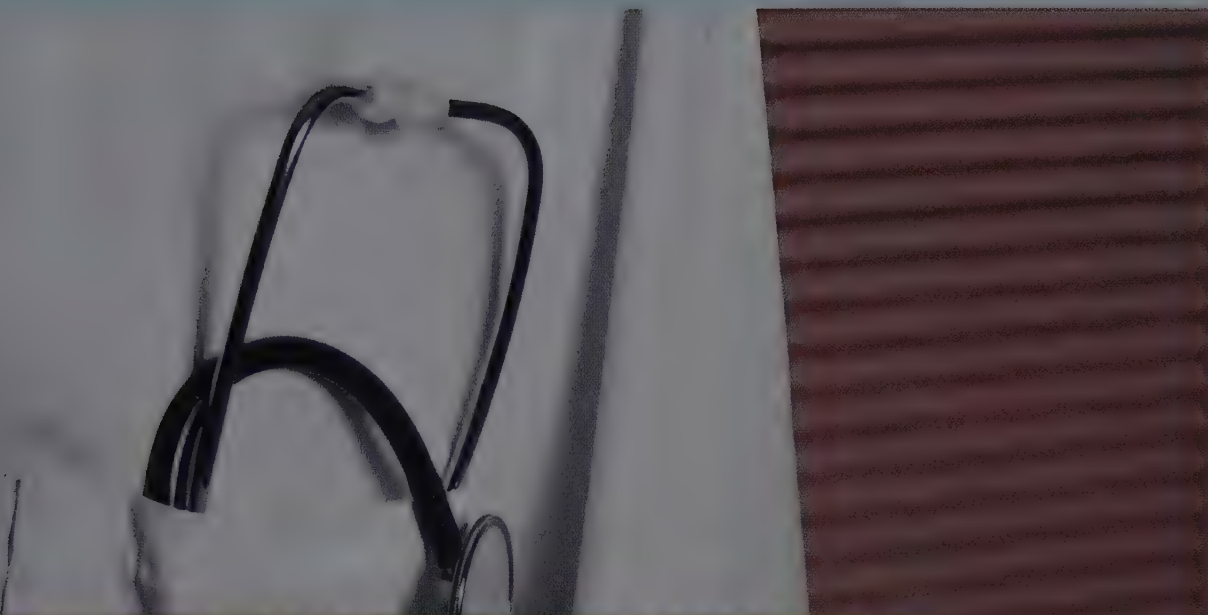
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Analysis for Decision Making

LEARNING OBJECTIVES

- 1** Explain how managers make short-run decisions during the management cycle, and identify the steps in the management decision cycle.
- 2** Define and explain incremental analysis and its related concepts.
- 3** Prepare evaluations of alternatives for make-or-buy decisions, special order decisions, product mix decisions, and sell or process-further decisions.
- 4** Identify the types of projected costs and revenues used to evaluate alternatives for capital investment.
- 5** Apply the concept of the time value of money.
- 6** Analyze capital investment proposals using the net present value method.
- 7** Analyze capital investment proposals using the accounting rate-of-return method and the payback period method.



DECISION POINT: A MANAGER'S FOCUS



Omni Healthcare Omni Healthcare is a health maintenance organization (HMO) that serves approximately 26 counties in northern California and has more than 130,000 members. Omni wants to compete successfully in the health care market by operating efficiently and finding new members. Omni Healthcare's goal is to provide affordable health care services that preserve members' freedom to choose their own physician and member hospital. Omni wants its front-line managers to make better, more informed decisions using timely, relevant information.

For example, Omni's actuarial staff, who review the cost of medical supplies, services, and pharmaceuticals, want to ask questions such as, What are the expenses of the most requested medical procedures in San Francisco County? They need information to negotiate the best contracts. Omni's marketing managers want to know, What is the membership growth in Marin County compared to Santa Clara County? They need information to identify successful marketing methods and new markets. The provider group staff, who are responsible for obtaining new providers, want to know, Do we have enough providers in Santa Clara County to support our membership base? They need information about provider group expenses to sign profitable contracts with provider groups.¹

How can a management accountant help Omni? The management accountant can use an information system, or data warehouse, to improve decision making by providing timely reports designed to summarize relevant information in a useful manner. The senior managers of companies like Omni work to develop strategic plans that include the development and use of data warehouses. Such warehouses enable organizations to simultaneously pursue a wide variety of complex goals because they are designed to provide the specific, high-quality information managers need to make decisions and monitor progress.

Information for Short-Run Decisions

OBJECTIVE

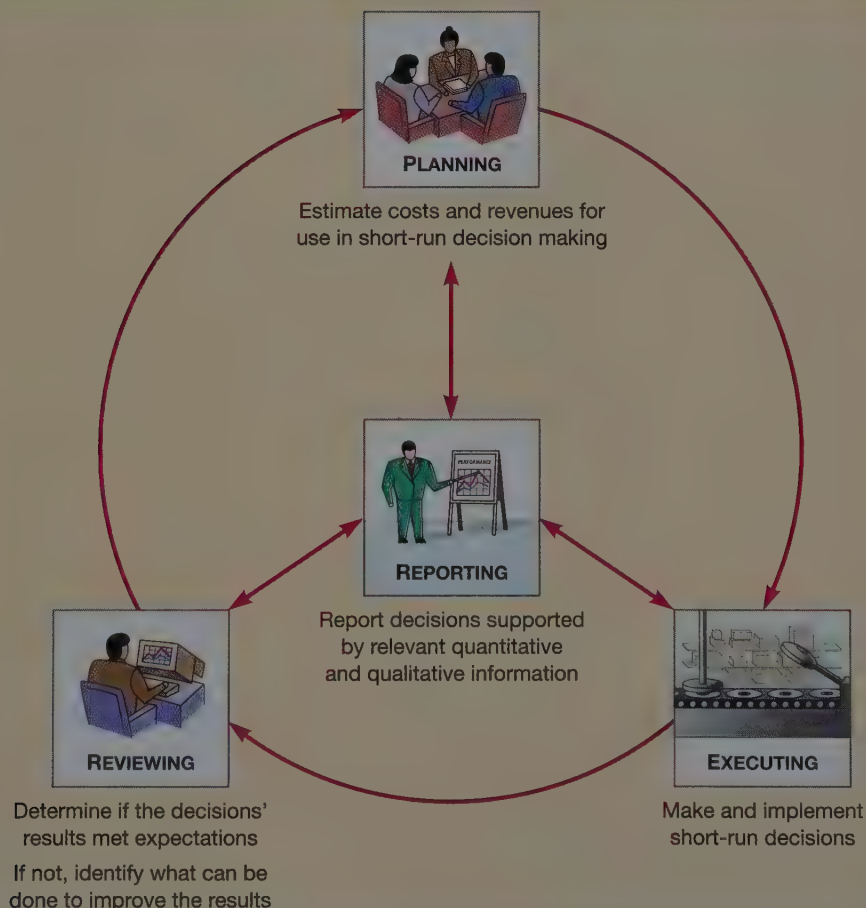
1 Explain how managers make short-run decisions during the management cycle, and identify the steps in the management decision cycle

Readers of financial reports are interested in knowing *what happened*. The historical information disclosed in financial reports helps to answer that question. For planning and control purposes, managers want to know *why things happened*. They use historical financial and nonfinancial quantitative information to analyze the results of business actions. In this chapter, we focus on *what will happen*. Managers make many decisions that will affect their organization's activities in the short run. They need historical and estimated quantitative information that is both financial and nonfinancial in nature. Such information should be relevant, timely, and presented in a format that is easy to use in decision making. The information will help managers to consider the question, What will happen if we choose one alternative over another?

Short-Run Decision Analysis and the Management Cycle

As illustrated in Figure 1, **short-run decision analysis** is an important component of the management cycle. It is the systematic examination of any decision whose effects will be most felt over the next year or less. In the planning stage of the management cycle, managers estimate cost and revenue information for use in making short-run decisions during the coming year. In this chapter, we focus on the

Figure 1
Cost Information for Short-Run
Decisions in the Management
Cycle



executing stage of the management cycle, which is the stage in which managers must adapt to changing environments and take advantage of opportunities that will improve their organization's profitability and liquidity in the short run. During the year, managers may need to decide whether to make a part or buy it from an outside supplier, have an opportunity to sell a special order, select the appropriate product mix given a resource constraint, or decide whether to sell a product as is or process it further. All of those decisions affect operations in the current operating period. In the reviewing stage of the management cycle, each decision is evaluated to determine if the forecasted results were obtained. If the results are not as predicted, corrective action must be identified and taken. Finally, the reporting stage takes place continuously during the management cycle. Budgets will include relevant estimated cost and revenue information for some decisions. Short-run decision reports will show the analysis that supports a decision. Other reports will provide information about the results of a decision.



As a general rule, the managers of companies like Omni Healthcare will make decisions that support the company's strategic plan. For example, the managers of a hospital may have to make a decision about keeping or eliminating one of the organization's prestigious medical procedures, performing heart transplants. Both quantitative and qualitative factors will influence the decision. The quantitative information includes the costs of performing a heart transplant and the fee revenues that the procedure generates. Management may also want to know the number of heart transplants performed each year, the average time taken to complete the operation, and the average number of patient days in the hospital. Examples of qualitative factors that would influence the decision include the qualifications of the medical team; the efficiency and effectiveness of the equipment; success, infection, and mortality rates; health insurers' restrictions on the procedure; and the community's needs. Some of this information is generated in the planning stage of the management cycle.

In the executing stage, the hospital's managers might choose to eliminate the procedure if its costs exceed the revenues generated. However, they may choose to keep the procedure because the community expects the organization to provide this service. Other qualitative factors that can be weighed in the decision include:

- Competition (Do our competitors perform this operation?)
- Economic conditions (Do insurance companies cover such operations?)
- Social issues (Will we benefit the community by offering this operation?)
- Product or service quality (Can we attract more business by providing the best service?)
- Timeliness (Can we promote a quick and healthy recovery?)

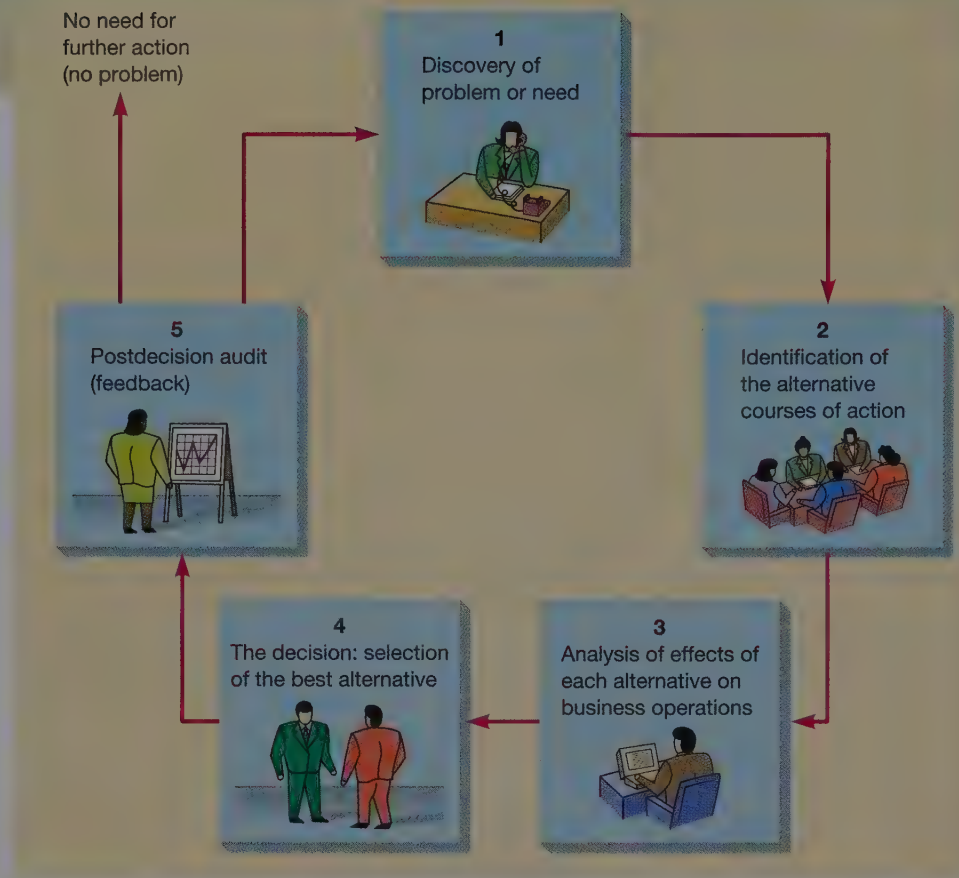
Managers must identify and assess the importance of all such factors when making short-run decisions. They must also make sure that the decision is compatible with their organization's strategic plan. During the reviewing stage, the managers will measure the effect of their decision on the net income of the organization. Omni managers will prepare reports to support the information selected, the decision made, and the effect of that decision on the organization.

The Management Decision Cycle

Although many business problems are unique and cannot be solved by following strict rules, managers frequently take five predictable actions when deciding what to do. The five steps managers take in making decisions and following up on them comprise the **management decision cycle**.

As shown in Figure 2, step 1 in the cycle is the discovery of a problem or need. Then in step 2, the managers involved in the decision identify all reasonable

Figure 2
The Management Decision
Cycle



courses of action that will solve the problem or meet the need. In step 3, the managers prepare a thorough analysis of each possible solution, identifying its total costs, revenues, and other financial effects. Each alternative may require different cost information. In step 4, after studying the information they have gathered and organized in a meaningful way, the managers select the best course of action. In step 5, after the decision has been carried out, the managers study its effects on the operation. The resulting postdecision audit supplies feedback about the results of the decision. If the solution is not completely satisfactory or if problems remain, the decision cycle begins again. If the solution settled the problem, then the decision cycle is complete.

Incremental Analysis for Management Decisions

OBJECTIVE

2 Define and explain incremental analysis and its related concepts

Once managers have determined that a problem or need is worthy of consideration and have identified alternative courses of action, they must evaluate the effect that each alternative will have on their organization. This requires the gathering of data, as well as the preparation of analyses and reports that will enable the managers to make an informed decision. The reports will include only the projected revenues and costs that are relevant to the decision and will omit any information that is irrelevant.

Incremental Analysis Illustrated

The method of comparing alternatives by focusing on the differences in their projected revenues and costs is called **incremental analysis**. Incremental analysis is also called *differential analysis*. Incremental analysis ignores revenues or costs that stay the same or that do not differ among the alternatives.

For example, assume that a management accountant is preparing a report to help the managers of Lennox Company decide which of two mill blade grinders—C or W—to buy. The grinders have the same purchase price but have different revenue and cost characteristics. The company currently owns Grinder B, which it bought three years ago for \$15,000 and which now has accumulated depreciation of \$9,000 and a carrying value of \$6,000. Grinder B is now obsolete because of advances in technology and cannot be sold or traded in.

The accountant has collected the following annual revenue and operating cost estimates for the two new machines:

	Grinder C	Grinder W
Increase in revenue	\$16,200	\$19,800
Increase in annual operating costs		
Direct materials	4,800	4,800
Direct labor	2,200	4,100
Variable manufacturing overhead	2,100	3,050
Fixed manufacturing overhead (depreciation included)	5,000	5,000

The first step in the incremental analysis is to eliminate any irrelevant revenues and costs. Revenues are irrelevant if they will not differ between the alternatives. Irrelevant costs include sunk costs and costs that will not differ between the alternatives. A **sunk cost** is a cost that was incurred because of a previous decision and that cannot be recovered through the current decision. An example of a sunk cost is the carrying value of Grinder B. A manager might be tempted to say that the grinder cannot be junked because the company still has \$6,000 invested in it. However, the manager would be incorrect because the book value of the old grinder represents money that was spent in the past and so does not affect the decision about whether to replace the old grinder with a new one. The old grinder would be of interest only if it could be sold or traded in, and the amount received for it would be different, depending on which new grinder was chosen. In that case, the amount of the sale or trade-in value would be relevant to the decision because it would affect the future cash flows of the alternatives.

Another look at the figures for Grinders C and W reveals two other irrelevant costs. The costs of direct materials and fixed manufacturing overhead (depreciation included) can also be eliminated from the analysis because they are the same for both alternatives.

Once the irrelevant revenues and costs have been identified, the incremental analysis can be prepared, using only the projected revenues and expenses that will differ between the alternative grinders, as shown in Exhibit 1. The analysis shows that Grinder W would produce \$750 more in operating income than Grinder C. Given that the costs of buying the two grinders are the same, this report would favor the purchase of Grinder W.

Because incremental analysis focuses on only the quantitative differences among the alternatives, it simplifies management's evaluation of a decision and reduces the time needed to choose the best course of action. However, incremental analysis is only one input to the final decision. Management needs to consider other issues. For instance, the manufacturer of Grinder C might have a reputation for providing better quality or service than the manufacturer of Grinder W.

Exhibit 1
Incremental Analysis

Lennox Company Incremental Analysis			
	Grinder C	Grinder W	Difference in Favor of Grinder W
Increase in revenues	\$16,200	\$19,800	\$3,600
Increased operating costs that differ between alternatives			
Direct labor	2,200	4,100	(1,900)
Variable manufacturing overhead	2,100	3,050	(950)
Total relevant operating costs	\$ 4,300	\$ 7,150	(\$2,850)
Resulting change in operating income	\$11,900	\$12,650	\$ 750

Special Considerations in Short-Run Decision Analysis

When analyzing short-run decisions, managers must consider the effects of opportunity costs and the need to prepare special decision reports.

OPPORTUNITY COSTS **Opportunity costs** are the revenues forfeited or lost when one alternative is chosen over another. For example, consider a plant nursery that has been in business for many years at the intersection of two highways. Suburbs have grown up around the nursery, and the developer of a shopping mall has offered the nursery owner a high price for the land. The interest that could be earned from investing the proceeds of the sale is an opportunity cost for the nursery owner. It is revenue that the nursery owner has chosen to forgo to continue operating the nursery in that location.

A bank teller who is deciding whether to go back to school full-time to earn a degree in finance also needs to consider opportunity cost. In this case, the opportunity cost is the salary the teller would lose by returning to school. The total cost of the degree includes not only tuition, books, supplies, and living expenses, but also the amount of salary forgone while the teller is a full-time student. This opportunity cost is one reason many people choose to work full-time and attend college part-time.

Opportunity costs often come into play when a company is operating at or near capacity and must choose what product to manufacture. For example, assume that Lennox Company, which currently produces 20,000 units of Product A, has the option of producing 15,000 units of Product B, a higher-priced product, but it cannot produce both. The amount of income from the 20,000 units of Product A is an opportunity cost of manufacturing Product B.

TRADITIONAL VERSUS SPECIAL DECISION REPORTS The contribution margin format of income reporting, as discussed in the chapter on cost-volume-profit analysis, is often used in decision analysis. Contribution margin is commonly used to make decisions about selling special orders and to select the appropriate product mix when a resource is constrained.

Income statements in the contribution margin format and incremental analyses work best when quantitative information is being compared. In some cases, however, managers may be considering many alternatives, each of which would be best



When Roger B. Smith, the former chairman and CEO of General Motors, was interviewed on the subject of ethics, he had the following to say: "The world is not neat and orderly, and arriving at an ethical decision can be difficult. It has been wisely observed that 'It is easy to do what is right; it is hard to know what is right.' . . . In the final analysis, each of us must exercise individual judgment and answer to our own conscience. As General Motors employees, we should

never do anything we would be ashamed to explain to our family or afraid to see on the front page of the local newspaper.

"Ethical conduct in business goes beyond this, however. For example, one of the basic needs top management has is to receive reliable data and honest opinions from people throughout the organization. Management needs to hear bad news as well as good news. Too often, subordinates are reluctant to tell all of the details of a project or assignment that has failed or is in trouble. This very human trait occurs in all walks of life, whether personal, business, or government, and contributes to the making of bad decisions. In short, ethics is an essential element of success in business."²

in certain circumstances. One alternative may generate more operating income, whereas another would diversify the company's product line. A third alternative may prevent a huge layoff and bolster the company's goodwill. Even though several alternatives may be equally good, management must choose only one. In such cases, qualitative information must support or replace the quantitative analyses, and managers must use imagination to prepare a special decision report that demonstrates which alternative is best under the circumstances.

For most special decision reports, there is no one correct, set structure. Experienced managers and accountants prepare such reports to fit individual situations. In this course, you can solve most of the problems by following the examples in the text. But remember that in practice, managers and accountants must create formats appropriate for existing circumstances.

Types of Short-Run Decisions

OBJECTIVE

3 Prepare evaluations of alternatives for make-or-buy decisions, special order decisions, product mix decisions, and sell or process-further decisions

Many business decisions can be made using income statements generated by incremental analysis. In this section, we use those tools to select the best alternative when managers face (1) make-or-buy decisions, (2) special order decisions, (3) product mix decisions, and (4) sell or process-further decisions.

Make-or-Buy Decisions

A common problem facing managers of manufacturing organizations is whether to make or to buy some or all of the parts used in product assembly. The goal of **make-or-buy analysis** is to help management select the more profitable choice by identifying the costs of each alternative and their effects on revenues and existing costs. The following information is needed for this analysis:

Information About Making

Need for additional machinery
Variable costs of making the item
Incremental fixed costs

Information About Buying

Purchase price of item
Rent or net cash flows to be generated from vacated space in factory
Residual value of unused machinery

Exhibit 2
Incremental Analysis:
Make-or-Buy Decision

Trenot Electronics Company Make-or-Buy Decision Incremental Analysis			
	Make	Buy	Difference in Favor of Make
Direct materials (20,000 × \$.84)	\$16,800	—	(\$16,800)
Direct labor (20,000 × \$.40)	8,000	—	(8,000)
Variable manufacturing overhead (1,000 hours × \$4)	4,000	—	(4,000)
To purchase completed casings (20,000 × \$1.50)	—	\$30,000	30,000
Totals	<u>\$28,800</u>	<u>\$30,000</u>	<u>\$ 1,200</u>

The case of the Trenot Electronics Company illustrates a make-or-buy decision. For the past five years, the firm has purchased a small transistor casing from an outside supplier at a cost of \$1.25 per casing. The supplier has just informed Trenot Electronics that it is raising the price 20 percent, effective immediately. Trenot has idle machinery that could be adjusted to produce the casings. Trenot estimates the cost of direct materials at \$.84 per casing. Workers, who will be paid \$8.00 per hour, can process 20 casings per hour (\$.40 per casing). The cost of variable manufacturing overhead will be \$4 per direct labor hour, and 1,000 direct labor hours will be required. Fixed manufacturing overhead includes \$4,000 of depreciation per year and \$6,000 of other fixed costs. Annual production and usage would be 20,000 casings. The space and machinery to produce the casing would be idle if the part were purchased. Should Trenot Electronics Company make or buy the casings?

Exhibit 2 presents an incremental analysis of the two alternatives. All relevant costs are listed. Because the machinery has already been purchased and neither the machinery nor the required factory space has any other use, the depreciation costs and other fixed manufacturing overhead costs are the same for both alternatives; therefore, they are not relevant to the decision. The cost of making the needed casings would be \$28,800. The cost of buying 20,000 casings would be \$30,000 at the increased purchase price. The company would save \$1,200 by making the casings, and it should do so.

Special Order Decisions

Managers are often faced with special order decisions, which are decisions about whether to accept or reject special orders for products at prices below normal market prices. Special orders usually call for the manufacture of large numbers of similar products to be sold in bulk (packaged in large containers). **Special order analysis** is designed to help managers decide whether to accept or reject a special order.

Because special orders are not expected, they are not included in annual cost or sales estimates. And, because such orders are one-time events, they should not be included in cost or revenue estimates for subsequent years. A company should consider a special order only if unused capacity exists. Moreover, before a firm accepts a special order, it must be sure that the products involved are sufficiently different

from its regular product line to avoid violating federal price discrimination laws. The firm must also be sure that the special order will not affect its normal sales quantity or sales price with traditional customers or tarnish its brand image.

Goodman Sporting Goods, Inc., manufactures a complete line of sports equipment. Deck Enterprises operates a large chain of discount stores. Deck has approached Goodman with a special order for 30,000 cross-stitched baseballs. Instead of being packaged individually, the balls will be bulk packed in boxes containing 500 baseballs each. Deck is willing to pay \$2.45 per baseball.

The Goodman Accounting Department knows that annual expected production is 400,000 baseballs, the current year's production is 410,000 baseballs, and the maximum production capacity is 450,000 baseballs. The following additional information is available:

Unit cost data	
Direct materials	\$.90
Direct labor	.60
Manufacturing overhead	
Variable	.50
Fixed ($\$100,000 \div 400,000$)	.25
Packaging per unit	.30
Advertising ($\$60,000 \div 400,000$)	.15
Other fixed selling and administrative expenses ($\$120,000 \div 400,000$)	.30
Total unit cost	<u>\$ 3.00</u>
Unit selling price	<u>\$ 4.00</u>
Total estimated bulk packaging costs for special order (30,000 baseballs; 500 per box)	<u>\$2,500</u>

Should Goodman Sporting Goods, Inc., accept Deck's offer?

A comparative analysis in the contribution margin format appears in Exhibit 3. The report shows operating income for the Baseball Division both with and without the Deck offer. The only costs affected by the order are direct materials, direct

Exhibit 3
Contribution Margin Analysis:
Special Order Decision

Goodman Sporting Goods, Inc. Special Order Decision Contribution Margin Analysis		
	Without Deck Order (410,000 products)	With Deck Order (440,000 products)
Sales	\$1,640,000	\$1,713,500
Less variable costs		
Direct materials	\$ 369,000	\$ 396,000
Direct labor	246,000	264,000
Variable manufacturing overhead	205,000	220,000
Packaging costs	123,000	125,500
Total variable costs	\$ 943,000	\$1,005,500
Contribution margin	<u>\$ 697,000</u>	<u>\$ 708,000</u>

labor, variable manufacturing overhead, and packaging. Packaging costs will increase, but only by the amount of the added bulk packaging. The per-unit packaging costs will not be incurred. All fixed costs will remain the same and thus are eliminated from the analysis. The net result of accepting the special order is an \$11,000 increase in contribution margin (and, correspondingly, in operating income), as shown by the following incremental analysis:

Sales (30,000 units \times \$2.45)		\$73,500
Less variable costs		
Direct materials (30,000 units \times \$.90)	\$27,000	
Direct labor (30,000 units \times \$.60)	18,000	
Variable manufacturing overhead (30,000 units \times \$.50)	15,000	
Additional bulk packaging costs	<u>2,500</u>	
Total variable costs		<u>62,500</u>
Contribution margin		<u>\$11,000</u>

Thus, the analysis reveals that the special order from Deck Enterprises should be accepted.

The fixed costs of existing facilities would usually not change if a special order were accepted and are, therefore, usually irrelevant to the decision. However, if additional fixed costs would be incurred, they would be relevant to the decision. Examples of relevant fixed costs include the purchase price of additional machinery, the cost of an increase in supervisory help, or an increase in insurance premiums required by a special order.

Product Mix Decisions



Profit analysis and maximization are possible only when the profitability of all product lines is known. How does General Motors Corporation determine which of its automobile products is most profitable? GM may also wish to determine which product or products contribute the most to company profitability in relation to the amount of capital assets or other scarce resources needed to produce the item(s). To answer these questions, managers must measure the contribution margin of each product. The next step is to determine a set of ratios of contribution margin to the required limiting resource. Once that step is completed, management should request a marketing study to identify the upper limits of demand for the most profitable products. If product profitability can be computed and adequate market demand exists, management should shift production to the more profitable products, given the company's resources.

Many kinds of decisions can be based on the approach described here. **Product mix analysis** determines the most profitable combination of products or services when a company produces more than one product or offers more than one service and resources are constrained. Closely related to product mix analysis is the product line profitability study, which is designed to discover which products are losing money for the company. The same decision approach is used, but the goal is to eliminate any unprofitable product line(s). Another area of study is corporate segment analysis. The contribution margin approach is again used, this time with the goal of isolating production costs to identify any unprofitable segment(s). If corrective action is not possible, management should eliminate the noncontributing segment(s). Even though we will not give specific examples of a product line profitability study or a corporate segment analysis, it is important to remember that they use the same technique as product mix analysis.

Assume that the management of Bradley Enterprises is analyzing its product mix. The company manufactures three computer games—Rising Star, Ghost

Exhibit 4
Contribution Margin Analysis:
Product Mix Decision

Bradley Enterprises Product Mix Decision Contribution Margin Analysis			
	Rising Star	Ghost Master	Road Warrior
Selling price per unit	\$24.00	\$18.00	\$32.00
Less variable costs			
Manufacturing	\$12.50	\$10.00	\$18.75
Selling	6.50	5.00	6.25
Total unit variable costs	\$19.00	\$15.00	\$25.00
Contribution margin per unit (A)	\$ 5.00	\$ 3.00	\$ 7.00
Machine hours per unit (B)	2	1	2.5
Contribution margin per machine hour (A ÷ B)	\$ 2.50	\$ 3.00	\$ 2.80

Master, and Road Warrior—using the same production equipment. The total productive capacity is being used. Following are the product line statistics.

	Rising Star	Ghost Master	Road Warrior
Current production and sales (units)	20,000	30,000	18,000
Machine hours per unit	2	1	2.5
Selling price per unit	\$24.00	\$18.00	\$32.00
Unit variable manufacturing costs	\$12.50	\$10.00	\$18.75
Unit variable selling costs	\$6.50	\$5.00	\$6.25

Should the company try to sell more of one product and less of another? If so, which computer game should be produced first? Second? Last?

Because total productive capacity is being used, the only way to expand the production of one product is to reduce the production of another. The product mix analysis of Bradley Enterprises is shown in Exhibit 4. Though contribution reporting is used here, contribution margin per product is not the important figure for a decision about shifts in product mix. In the analysis, Road Warrior has the highest contribution margin per unit. However, all products use the same machinery and all machine hours are filled. So machine hours are the scarce resource.

The analysis in Exhibit 4 goes one step beyond the computation of contribution margin per unit. A product mix decision such as this one should use two decision variables: contribution margin per unit and machine hours required per unit. For instance, Rising Star requires two machine hours to generate \$5 of contribution margin. But Ghost Master would generate \$6 of contribution margin using the same two machine hours. For this reason, we have calculated contribution margin per machine hours. Based on this information, management can readily see that Bradley Enterprises should produce and sell as much of Ghost Master as possible. Next, it should push Road Warrior. If any productive capacity remains, it should manufacture Rising Star.

Sell or Process-Further Decisions

Sometimes two or more products or services are created simultaneously from a common direct material or input. Such products, called **joint products**, cannot be identified as separate products during some or all of the production process. Only



at a specific point, called the **split-off point**, do joint products become separate and identifiable. Petroleum manufacturing often results in joint products. For example, when Exxon Corporation refines crude oil, it is only after the split-off point that gasoline, motor oil, and kerosene become identifiable as separate products.

Some products may be sold at the split-off point and others may be processed further. Extra processing adds value to a product and increases its selling price, but it also adds costs. Thus, manufacturers must often decide which approach will be more profitable. **Sell or process-further analysis** helps managers determine whether to sell a joint product at the split-off point or process it further. This technique enables managers to analyze the incremental costs and revenues of the two possible courses of action to see whether the increase in total revenue will exceed the additional costs of processing. *Joint costs incurred before split-off do not affect the decision.* Those costs are irrelevant to the decision because they are incurred regardless of the point at which the products are sold. Only future costs that will differ between alternatives are relevant to the decision.

The goal of a sell or process-further decision is to maximize operating income. For example, assume that Hilbrich Gardening Supplies, Inc., manufactures products that enhance plant growth. In one process, three products—Gro-Pow, Gro-Pow II, and Gro-Supreme—emerge from the joint or common initial phase. For each 20,000-pound batch of materials converted into products, \$120,000 in joint production costs are incurred. At split-off, 50 percent of the output becomes Gro-Pow, 30 percent becomes Gro-Pow II, and 20 percent becomes Gro-Supreme. Each product must be processed beyond split-off, and the following additional variable costs are incurred.

Product	Pounds	Additional Processing Costs
Gro-Pow	10,000	\$24,000
Gro-Pow II	6,000	38,000
Gro-Supreme	4,000	33,500
Totals	20,000	\$95,500

Linda & Parks Landscapers has offered to purchase any or all of the joint product at split-off for the following prices per pound: Gro-Pow, \$8; Gro-Pow II, \$24; and Gro-Supreme, \$40. To help decide whether to sell at split-off or process the product further, Hilbrich management performed the analysis shown in Exhibit 5. The first part of the exhibit lists the unit selling prices of the three products at split-off. The second part is an incremental analysis that compares the increases in revenue and processing costs for each alternative. The analysis shows that further processing of Gro-Pow increases operating income by \$16,000 and further processing of Gro-Supreme increases operating income by \$6,500. Hilbrich should therefore consider further processing those two products. However, the company loses \$2,000 by further processing Gro-Pow II. Thus, it will save money if Linda & Parks buys Gro-Pow II at the split-off point. Note that the joint processing costs of \$120,000 are irrelevant to the decision because they will be incurred with either alternative.

Measuring incremental costs for additional processing beyond split-off can create problems. Additional costs of direct materials, direct labor, and variable manufacturing overhead are incremental because they are caused by additional processing. However, supervisors' salaries, property taxes, insurance, and other fixed costs incurred regardless of the production decision are not incremental costs. Incremental processing costs should include only production costs incurred if a product is processed beyond split-off. Fixed manufacturing overhead costs common to other production activity must be excluded from a sell or process-further incremental analysis.

Exhibit 5
Incremental Analysis: Sell
or Process-Further Decision

Hilbrich Gardening Supplies, Inc.
Sell or Process-Further Decision
Incremental Analysis

Unit selling prices

Product	If Sold at Split-Off	If Sold After Processing Further
Gro-Pow	\$ 8	\$12
Gro-Pow II	24	30
Gro-Supreme	40	50

Incremental analysis per 20,000-pound batch

Product	(1) Pounds	(2) Total Revenue if Sold at Split-Off	(3) Total Revenue if Sold After Processing Further	(4) Incremental Revenue (3) – (2)	(5) Incremental Costs	(6) Effect on Operating Income (4) – (5)
Gro-Pow	10,000	\$ 80,000	\$120,000	\$40,000	\$24,000	\$16,000
Gro-Pow II	6,000	144,000	180,000	36,000	38,000	(2,000)
Gro-Supreme	4,000	160,000	200,000	40,000	33,500	6,500

Capital Investment Decisions

OBJECTIVE

4 Identify the types of projected costs and revenues used to evaluate alternatives for capital investment

Among the most significant decisions facing management are **capital investment decisions**, which are decisions about when and how much to spend on capital facilities and other long-term projects. Capital facilities and projects may include machinery, systems, or processes; building additions, renovations, or new structures; entire new divisions or product lines; or distribution and software systems. Thus, decisions about installing new equipment, replacing old equipment, expanding the production area by adding to a building, buying or building a new factory, or acquiring another company are all examples of capital investment decisions. Spending on capital assets is expensive. A new factory or production system may cost millions of dollars and require several years to complete. When making capital investment decisions, managers must be careful to select the alternatives that contribute the most to profits.

Capital Investment Analysis: A Cooperative Venture

The process of making decisions about capital investments is called **capital investment analysis**, or *capital budgeting*. This analysis is an important tool both for large corporations, such as Microsoft, and for smaller companies, such as Standard Locknut & Lockwasher, Inc., in Westfield, Indiana. Capital investment



analysis consists of identifying the need for a capital investment, analyzing courses of action to meet that need, preparing reports for managers, choosing the best alternative, and dividing funds among competing needs. People in every part of the organization participate in capital investment analysis. Financial analysts supply a target cost of capital or desired rate of return and an estimate of how much money can be spent annually on capital facilities. Marketing specialists predict sales trends and new product demands, which help in determining which operations need expansion or new equipment. Managers at all levels help identify facility needs and often prepare preliminary cost estimates of the desired capital investments. Then all work together to implement the projects selected and to keep results within revenue and cost estimates.

Measures Used in Capital Investment Analysis

When evaluating a proposed capital investment, managers must predict how the new asset will perform and how it will benefit the company. Various measures are used to estimate the benefits to be derived from a capital investment.

NET INCOME AND NET CASH INFLOWS Each capital investment analysis must include a measure of the expected benefit from the investment project. The measure of expected benefit depends on the method of analyzing capital investment alternatives. One possible measure is net income, calculated in the usual way. Increases in net income resulting from the capital investment must be determined for each alternative. A more widely used measure of expected benefit is projected cash flows. **Net cash inflows** are the balance of increases in projected cash receipts over increases in projected cash payments resulting from a capital investment. In some cases, equipment replacement decisions involve alternatives that do not increase current revenue. In such cases, **cost savings** are the benefits, such as reduced costs, from proposed capital investments.

Either net cash inflows or cost savings can be used as the basis for an evaluation, but one measure should not be confused with the other. If the analysis involves cash receipts, net cash inflows are used. If the analysis involves only cash outlays, cost savings are used. All the investment alternatives must be measured and evaluated consistently.

EQUAL VERSUS UNEQUAL CASH FLOWS Projected cash flows may be the same for each year of an asset's life, or they may vary from year to year. Unequal cash flows are common and must be analyzed for each year of an asset's life. Proposed projects with equal annual cash flows require less detailed analysis. Both a project with equal cash flows and one with unequal cash flows are illustrated and the analysis of cash flows is explained later in this chapter.

CARRYING VALUE OF ASSETS **Carrying value** is the undepreciated portion of the original cost of a fixed asset. When evaluating a decision to replace an asset, the carrying value of the old asset is irrelevant because it is a past, or historical, cost and will not be altered by the decision. Net proceeds from the asset's sale or disposal are relevant, however, because the proceeds affect cash flows and may differ for each alternative.

DEPRECIATION EXPENSE AND INCOME TAXES Depreciation expense affects the determination of net income but does not require a current outlay of cash. It can, however, affect cash flows because of its effects on income taxes. In this chapter it is assumed that those effects have been taken into consideration in computing net

cash inflows. Computations that involve income taxes are deferred until more advanced classes.

DISPOSAL OR RESIDUAL VALUES Proceeds from the sale of an old asset are current cash inflows and are relevant to evaluating a proposed capital investment. Projected disposal or residual values of replacement equipment are also relevant because they represent future cash inflows and usually differ among alternatives. Remember, residual values will be received at the end of the asset's estimated life.

The Time Value of Money

OBJECTIVE

5 Apply the concept of the time value of money

An organization has many options for investing capital besides buying fixed assets. Consequently, management expects a fixed asset to yield a reasonable return during its useful life. A key question in capital investment analysis is how to measure the return on a fixed asset. One way is to look at the cash flows the asset will generate during its useful life. When an asset has a long useful life, management will usually analyze those cash flows in terms of the time value of money. The **time value of money** is the concept that cash flows of equal dollar amounts separated by a time interval have different present values because of the effects of compound interest. The notions of interest, present value, and future value are all related to the time value of money.

Interest

Interest is the cost associated with the use of money for a specific period of time. Because interest is a cost associated with time, and "time is money," interest is an important consideration in any business decision. **Simple interest** is the interest cost for one or more periods when the amount on which the interest is computed stays the same from period to period. **Compound interest** is the interest cost for two or more periods when the amount on which interest is computed changes in each period to include all interest paid in previous periods. In other words, compound interest is interest earned on a principal sum that is increased at the end of each period by the interest for that period.

EXAMPLE: SIMPLE INTEREST Joe Sanchez accepts an 8 percent, \$30,000 note due in 90 days. How much will he receive in total when the note comes due? The formula for calculating simple interest is

$$\begin{aligned}\text{Interest} &= \text{Principal} \times \text{Rate} \times \text{Time} \\ &= \$30,000 \times 8/100 \times 90/360 = \$600\end{aligned}$$

The total that Sanchez will receive is computed as follows:

$$\begin{aligned}\text{Total} &= \text{Principal} + \text{Interest} \\ &= \$30,000 + \$600 = \$30,600\end{aligned}$$

EXAMPLE: COMPOUND INTEREST Ann Clary makes a deposit of \$5,000 in a savings account that pays 6 percent interest. She expects to leave the principal and accumulated interest in the account for three years. How much will her account total at the end of three years? Assume that the interest is paid at the end of the year, that it is added to the principal at that time, and that this total in turn earns interest. The amount at the end of three years may be computed as follows:

(1) Year	(2) Principal Amount at Beginning of Year	(3) Annual Amount of Interest (col. 2 \times .06)	(4) Accumulated Amount at End of Year (col. 2 + col. 3)
1	\$5,000.00	\$300.00	\$5,300.00
2	5,300.00	318.00	5,618.00
3	5,618.00	337.08	5,955.08

At the end of three years, Clary will have \$5,955.08 in her savings account. Note that the annual amount of interest increases each year by the interest rate times the interest of the previous year. For example, between year 1 and year 2, the interest increased by \$18 (\$318 – \$300), which exactly equals 6 percent times \$300.

Present Value

Suppose that you had the choice of receiving \$100 either today or one year from today. Intuitively, you would choose to receive the \$100 today. Why? You know that if you have the \$100 today, you can put it in a savings account to earn interest, so that you will have more than \$100 a year from today. Therefore, we can say that an amount to be received in the future (future value) is not worth as much today as the same amount to be received today (present value) because of the cost associated with the passage of time. Future value and present value are closely related. **Future value** is the amount an investment will be worth at a future date if invested today at compound interest. **Present value** is the amount that must be invested today at a given rate of compound interest to produce a given future value.

For example, assume that Dapper Company needs \$1,000 one year from now. How much should the company invest today to achieve that goal if the interest rate is 5 percent? The following equation may be used:

$$\text{Present Value} \times (1.0 + \text{Interest Rate}) = \text{Future Value}$$

$$\text{Present Value} \times 1.05 = \$1,000.00$$

$$\text{Present Value} = \$1,000.00 \div 1.05$$

$$\text{Present Value} = \$952.38$$

Thus, to achieve a future value of \$1,000.00, a present value of \$952.38 must be invested. Interest of 5 percent on \$952.38 for one year equals \$47.62, and the two amounts added together equal \$1,000.00.

FOCUS ON BUSINESS PRACTICE

Not-for-profit organizations can also use the techniques of capital investment analysis. For example, if you were



a manager at the Field Museum of Chicago, how would you decide whether or not to buy rare dinosaur bones? The museum's officers faced such a dilemma when they had the opportunity to bid at auction on the most complete skeleton ever found of a *Tyrannosaurus rex*. The museum bought the bones for

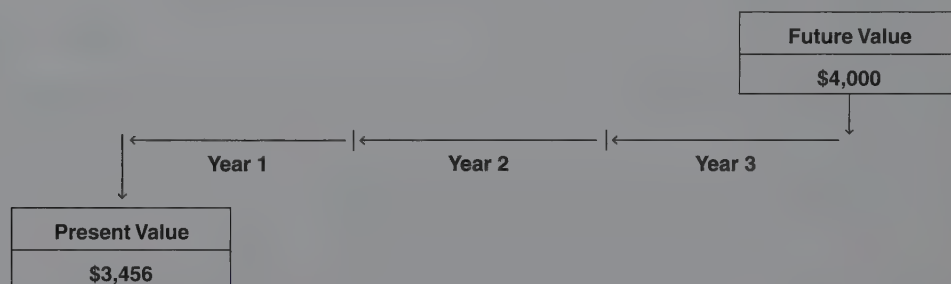
\$8.2 million and spent another \$9 million to restore and install the dinosaur, known as Sue. The museum projected that Sue would attract one million new visitors, who would produce \$5 million in admissions and spend several more million dollars on food, gifts, and the like. After deducting operating costs, museum officials used discounted present values to calculate a return on investment of 10.5 percent. Given that the museum's cost of capital was 8.5 percent, Sue's purchase was considered a financial success. Sue has been extremely popular with the public and more than met the museum's attendance goals in the first year after installation.³

THE PRESENT VALUE OF A SINGLE SUM DUE IN THE FUTURE

When more than one time period is involved, the calculation of present value is more complicated. For example, Riley Company wants to be sure of having \$4,000 at the end of three years. How much must the company invest today in a 5 percent savings account to achieve that goal? By adapting the preceding equation, the present value of \$4,000 at compound interest of 5 percent for three years in the future may be computed as follows:

Year	Amount at End of Year		Divide by		Present Value at Beginning of Year
3	\$4,000.00	÷	1.05	=	\$3,809.52
2	3,809.52	÷	1.05	=	3,628.11
1	3,628.11	÷	1.05	=	3,455.34

Riley Company must invest a present value of \$3,455.34 to achieve a future value of \$4,000 in three years. This calculation is made much easier by using the appropriate table from the appendix on future value and present value tables. In Table 3, we look down the 5 percent column until we reach period 3. There we find the factor .864. This factor, when multiplied by \$1, gives the present value of \$1 to be received three years from now at 5 percent interest. Thus, we solve the problem as follows:



$$\text{Future Value} \times \text{Present-Value Factor} = \text{Present Value}$$

$$\$4,000 \times .864 = \$3,456$$

Except for a rounding difference of \$.66, this gives the same result as the previous calculation.

THE PRESENT VALUE OF AN ORDINARY ANNUITY

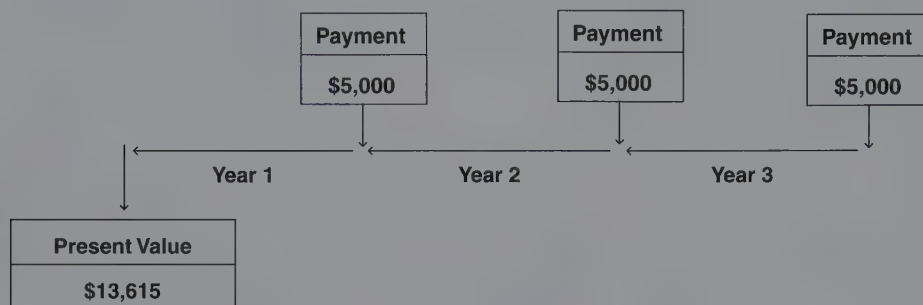
It is often necessary to compute the present value of a series of receipts or payments. When we calculate the present value of equal amounts equally spaced over a period of time, we are computing the present value of an ordinary annuity. An **ordinary annuity** is a series of equal payments or receipts that will begin one time period from the current date.

For example, assume that Foster Company has sold a piece of property and is to receive \$15,000 in three equal annual cash payments of \$5,000, beginning one year from today. What is the present value of this sale, assuming a current interest rate of 5 percent? This present value may be determined by calculating a separate present value for each of the three payments (using Table 3) and summing the results, as follows:

Future Cash Receipts (Annuity)			Present-Value Factor at 5 Percent (from Table 3)		Present Value
Year 1	Year 2	Year 3			
\$5,000			×	.952	= \$ 4,760
	\$5,000		×	.907	= 4,535
		\$5,000	×	.864	= 4,320
Total Present Value					<u><u>\$13,615</u></u>

The present value of this sale is \$13,615. Thus, there is an implied interest cost (given the 5 percent rate) of \$1,385 associated with the payment plan that allows the purchaser to pay in three installments.

We can calculate this present value more easily by using Table 4. We look down the 5 percent column until we reach period 3. There we find the factor 2.723. That factor, when multiplied by \$1, gives the present value of a series of three \$1 payments, spaced one year apart, at compound interest of 5 percent. Thus, we solve the problem as follows:



$$\text{Periodic Payment} \times \text{Present-Value Factor} = \text{Present Value}$$

$$\$5,000 \times 2.723 = \$13,615$$

This result is the same as the one computed earlier. If Foster Company is willing to accept a 5 percent rate of return, management will be equally satisfied to receive a single cash payment of \$13,615 today or three equal annual cash payments of \$5,000 over the next three years. This is the fundamental principle underlying the net present value method of evaluating capital investment alternatives.

When dealing with the time value of money, use discounting to find the present value of an amount to be received in the future. To determine present values of future amounts of money, use Tables 3 and 4 in the appendix on future value and present value tables. Remember that Table 3 deals with a single payment or amount, whereas Table 4 is used for a series of equal annual amounts.

Methods of Evaluating Proposed Capital Investments

OBJECTIVE

6 Analyze capital investment proposals using the net present value method

The most common methods of evaluating proposed capital investments are (1) the net present value method, (2) the accounting rate-of-return method, and (3) the payback period method. The accounting rate-of-return and payback period methods are easy to apply and are used as rough guides when evaluating capital investments. However, the net present value method is superior because it takes into account both the time value of money and cash flows.

The Net Present Value Method

The **net present value method** evaluates a capital investment by discounting its future cash flows to their present values and subtracting the amount of the initial investment from their sum. All capital investments are evaluated in the same way, and the projects with the highest net present value—the amount that exceeds the initial investment—are selected for implementation.

A significant advantage of the net present value method is that it incorporates the time value of money into the analysis of proposed capital investments. A capital investment's future cash inflows and outflows are discounted using the company's minimum rate of return to determine their present values. The minimum rate of return, or lowest acceptable rate, should at least equal the company's average cost of debt and equity capital.

Tables 3 and 4 in the appendix on future value and present value tables are used to discount each future cash inflow and cash outflow over the life of the asset to the present. If the net present value is positive (if the total of the discounted net cash inflows exceeds the cash investment at the beginning), the rate of return on the investment will exceed the company's minimum rate of return, or hurdle rate, and the project can be accepted. Conversely, if the net present value is negative (if the cash investment at the beginning exceeds discounted net cash inflows), the return on the investment is less than the minimum rate of return, and the project should be rejected. If the net present value is zero (if discounted cash inflows equal discounted cash outflows), the project meets the minimum rate of return and can be accepted.

THE NET PRESENT VALUE METHOD ILLUSTRATED Assume that Sophia Company is considering the purchase of a laser imaging machine that will improve efficiency in its Imaging Department. Management must choose between two models of the machine.

Model M will cost \$17,500 and will have an estimated residual value of \$2,000 after five years. It is projected to produce cash inflows of \$6,000, \$5,500, \$5,000, \$4,500, and \$4,000 during its five-year life.

Model N will cost \$21,000 and will have an estimated residual value of \$2,000. It is projected to produce cash inflows of \$6,000 per year for five years.

The company's minimum rate of return is 16 percent.

Because Model M is expected to produce unequal cash inflows, Table 3 in the appendix on future value and present value tables is used to determine the present value of the cash inflows from each year of the machine's life. The net present value of Model M is determined as follows:

Model M			
Year	Net Cash Inflows	16% Factor	Present Value
1	\$6,000	.862	\$ 5,172.00
2	5,500	.743	4,086.50
3	5,000	.641	3,205.00
4	4,500	.552	2,484.00
5	4,000	.476	1,904.00
Residual value	2,000	.476	952.00
Total present value of cash inflows			\$17,803.50
Less purchase price of Model M			17,500.00
Net present value			\$ 303.50

All the factors for this analysis can be found in the column for 16 percent in Table 3 of the appendix on future value and present value tables. The factors discount the individual cash flows, including the expected residual value, to the present. The amount of the investment in Model M is deducted from the total present value of the cash inflows to arrive at the net present value of \$303.50. Because the net

FOCUS ON INTERNATIONAL BUSINESS

Because capital investments are long-term projects that require commitments of large amounts of money to be spent in anticipation of profitable future returns, many things, in addition to costs, can influence their evaluation. International trade and national economies can also be part of the capital investment decision. A case in point is Thai Tech Steel Co., located in

Samut Prakan, Thailand. Company managers were planning to purchase a new computer system. However, because they were uneasy about the economies of Thailand and other Southeast Asian nations, they decided to postpone the purchase. They wanted to observe economic trends, such as currency depreciations, stock market gyrations, and interest rate changes, for a time before deciding to purchase the computer system. In uncertain economies, a short payback period becomes an important consideration in capital investment decisions.⁴

present value is positive, the proposed investment in Model M will achieve at least the minimum rate of return.

Because Model N is expected to produce equal cash receipts in each year of its useful life, Table 4 in the appendix on future value and present value tables is used to determine the combined present value of those future cash inflows. However, Table 3 is used to determine the present value of the machine's residual value. The net present value of Model N is calculated as follows:

Model N			
Year	Net Cash Inflows	16% Factor	Present Value
1–5	\$6,000	3.274	\$19,644.00
Residual value	2,000	.476	952.00
Total present value of cash inflows			\$20,596.00
Less purchase price of Model N			21,000.00
Net present value			(\$ 404.00)

Table 4 is used to determine the factor of 3.274, which is found in the column for 16 percent and the row for five periods. Because the residual value is a single inflow in the fifth year, the factor of .476 must be taken from Table 3 (the column for 16 percent and the row for five periods). The result is a net present value of (\$404). Because the net present value is negative, the proposed investment in Model N will not achieve the minimum rate of return.

The two analyses show that Model M should be chosen because it has a positive net present value and would achieve at least the company's minimum rate of return. Model N should be rejected because it does not achieve the minimum rate of return.

The Accounting Rate-of-Return Method

OBJECTIVE

7 Analyze capital investment proposals using the accounting rate-of-return method and the payback period method

The **accounting rate-of-return method** is an imprecise but easy way to measure the estimated performance of a capital investment. This method measures expected performance using two variables: (1) estimated annual net income from the project and (2) average investment cost. The basic equation is

$$\text{Accounting Rate of Return} = \frac{\text{Project's Average Annual Net Income}}{\text{Average Investment Cost}}$$

To compute average annual net income, use the cost and revenue data prepared for evaluating the project. Average investment in a proposed capital facility is calculated as follows:

$$\text{Average Investment} = \left(\frac{\text{Total Investment} - \text{Residual Value}}{2} \right) + \text{Residual Value}$$

To see how this equation is used in evaluating a proposed capital investment decision, assume the Gordon Company is interested in purchasing a new bottling machine. The company's management will consider only projects that promise to yield more than a 16 percent return. Estimates for the proposal include revenue increases of \$17,900 a year and operating cost increases of \$11,696 a year (including depreciation and taxes). The cost of the machine is \$51,000. Its residual value is \$3,000. To determine if the company should invest in the machine, compute the accounting rate of return as follows:

$$\begin{aligned} \text{Accounting Rate of Return} &= \frac{\$17,900 - \$11,696}{\left(\frac{\$51,000 - \$3,000}{2} \right) + \$3,000} \\ &= \frac{\$6,204}{\$27,000} \\ &= 23.0\% \end{aligned}$$

The projected rate of return is higher than the 16 percent minimum, so management should think seriously about making the investment.

The accounting rate-of-return method is widely used because it is easy to understand and apply. It does have several disadvantages, however. First, net income is used instead of cash flows. Second, the method is unreliable if estimated annual net incomes differ from year to year. Third, the time value of money is not considered in the analysis. Thus, future and present dollars are treated as equal.

The Payback Period Method

Instead of measuring a capital investment's rate of return, many managers estimate the cash flow the investment will generate. Their goal is to determine the minimum time it will take to recover the initial investment. If two or more investment alternatives are being studied, management should choose the investment that pays back its initial cost in the shortest time. That period of time is known as the **payback period**, and the method of evaluation is called the **payback period method**. The payback period is computed as follows:

$$\text{Payback Period} = \frac{\text{Cost of Investment}}{\text{Annual Net Cash Inflows}}$$

FOCUS ON BUSINESS PRACTICE

Organizations often use activity-based costing (ABC) in the preparation of annual operating budgets. In such cases, data must be broken down by the various activi-

ties of the organization. The same approach can be taken to creating information for capital investment analysis. Using ABC, managers identify the operating activities that will be affected by the decision and forecast cash flows for each activity. This approach provides a more detailed look at future cash flows and increases the accuracy of the forecasts supporting the decision.⁵

To apply the payback period method to the proposed capital investment of the Gordon Company, begin by determining the net cash inflows. To do so, first find and eliminate the effects of all noncash revenue and expense items included in the analysis of net income. In this case, the only noncash expense or revenue is machine depreciation. To calculate this amount, you must know the asset's life and the depreciation method. Suppose the Gordon Company uses the straight-line method of depreciation, and the new bottling machine will have a ten-year service life. Using this information and the facts given earlier, the payback period is computed as follows:

$$\begin{aligned}
 \text{Annual Depreciation} &= \frac{\text{Cost} - \text{Residual Value}}{10 \text{ (years)}} \\
 &= \frac{\$51,000 - \$3,000}{10} \\
 &= \$4,800 \text{ per year} \\
 \text{Payback Period} &= \frac{\text{Cost of Machine}}{\text{Cash Revenue} - \text{Cash Expenses}} \\
 &= \frac{\$51,000}{\$17,900 - (\$11,696 - \$4,800)} \\
 &= \frac{\$51,000}{\$11,004} \\
 &= 4.6 \text{ years}
 \end{aligned}$$

If the company's desired payback period is five years or less, this proposal would be approved.

If a proposed capital investment has unequal annual net cash inflows, the payback period is determined by subtracting each annual amount (in chronological order) from the cost of the capital investment. When a zero balance is reached, the payback period has been determined. This will often occur in the middle of a year. The portion of the final year is computed by dividing the amount needed to reach zero (the unrecovered portion of the investment) by the entire year's estimated cash inflow. The Review Problem at the end of the chapter illustrates this process.

Like the accounting rate-of-return method, the payback period method is widely used because it is easy to compute and understand. It is especially useful where there is rapid technological change, such as in Internet companies, and when risk is high, such as when investing in countries with emerging economies. However, the disadvantages of this approach far outweigh its advantages. First, the payback period method does not measure profitability. Second, it ignores differences in the present values of cash flows from different periods; thus it does not adjust cash flows for the time value of money. Finally, the payback period method emphasizes the time it takes to recover the investment rather than the long-term return on the investment. It ignores all future cash flows after the payback period is reached.

Chapter Review

REVIEW OF LEARNING OBJECTIVES



↑
Check out ACE, a self-quizzing
program on chapter content,
at <http://college.hmco.com>.

1. Explain how managers make short-run decisions during the management cycle, and identify the steps in the management decision cycle.

Both quantitative information and qualitative information are important for short-run decision analysis. Such information should be relevant, timely, and presented in a format that is easy to use in decision making. In the planning stage of the management cycle, managers estimate the cost and revenue information that will be useful for short-run decisions. Managers use this information during the executing stage to make decisions to make or buy a part, accept a special order, select the appropriate product mix given a resource constraint, or sell a product as is or process it further. In the reviewing stage, each decision is evaluated to determine if the forecasted results were obtained. Reporting occurs throughout the cycle to evaluate the information selected, the decision made, and the effect of that decision on the organization.

The management decision cycle begins with discovery of a problem or need. Then alternative courses of action to solve the problem or meet the need are identified. Next, a complete analysis to determine the effects of each alternative on business operations is prepared. With those supporting data, the decision maker chooses the best alternative. After the decision has been carried out, the managers conduct a postdecision review to see if the decision was correct or if other needs have arisen.

2. Define and explain incremental analysis and its related concepts.

Incremental analysis helps managers compare alternatives by focusing on the differences in their projected revenues and costs. Any data that relate to future costs, revenues, or uses of resources and that will differ among alternative courses of action are considered relevant decision information. Projected sales or estimated costs, such as direct materials or direct labor, that differ for each decision alternative are examples of relevant information. The managers organize relevant information to determine which alternative contributes the most to profits or incurs the lowest costs. Only data that differ for each alternative appear in the report. Sunk costs are past costs that are irrelevant to the decision process. Opportunity costs are revenues or income that is forgone as a result of choosing one alternative over another.

3. Prepare evaluations of alternatives for make-or-buy decisions, special order decisions, product mix decisions, and sell or process-further decisions.

Make-or-buy analysis helps managers decide whether to make or buy a part used in product assembly by identifying the costs of each alternative and their effects on revenues and existing costs. An incremental analysis of the expected costs and revenues for each alternative identifies the best alternative. To analyze special orders, managers must determine if there is unused capacity and find the lowest acceptable selling price for a product. Generally, fixed costs are irrelevant to the decision because those costs are covered by regular operations. Contribution margin analysis shows whether the special order increases income. Product mix analysis is used to find the most profitable combination of products when a company uses a common scarce resource to make more than one product. (A similar approach may be used for decisions involving the profitability of sales territories, service lines, or corporate segments.) The analysis uses the contribution margin format but goes one step further by examining the contribution margin per unit of scarce resource. Sell or process-further analysis

is based on comparisons of incremental costs and revenues of processing a product further. Any previous costs, including joint costs, are irrelevant to this decision because they are identical for both alternatives.

- 4. Identify the types of projected costs and revenues used to evaluate alternatives for capital investment.** Methods of evaluating capital investments evaluate net cash inflows or cost savings. The analysis process must take into consideration whether each period's cash flows will be equal or unequal. Except when considering their after-income-tax effect on cash flows, the carrying values and depreciation expense of assets awaiting replacement are irrelevant because they do not affect current or future cash flows. Net proceeds from the sale of an old asset and estimated residual value of a new facility represent future cash flows and must be part of the estimated benefit of a project. Depreciation expense on replacement equipment is relevant to evaluations based on after-tax cash flows.
- 5. Apply the concept of the time value of money.** Cash flows of equal dollar amounts at different times have different values because of the effect of compound interest. This phenomenon is known as the time value of money. Of the evaluation methods discussed in this chapter, only the net present value method takes into account the time value of money.
- 6. Analyze capital investment proposals using the net present value method.** The net present value method incorporates the time value of money into the analysis of a proposed capital investment. A minimum required rate of return, usually the average cost of capital, is used to discount an investment's expected future cash flows to their present values. The present values are added together, and the amount of the initial investment is subtracted from their total. If the resulting amount, called the net present value, is positive, the rate of return on the investment will exceed the required rate of return and the investment should be accepted. If the net present value is negative, the return on the investment will be less than the minimum rate of return and the investment should be rejected.
- 7. Analyze capital investment proposals using the accounting rate-of-return method and the payback period method.** When managers use the accounting rate-of-return method to evaluate two or more capital investment proposals, they select the alternative that yields the highest ratio of average annual net income to average cost of investment. The payback period method of evaluating a capital investment focuses on the minimum length of time needed to get back in cash the amount of the initial investment. Both methods are easy to use, but they are very rough measures and they do not consider the time value of money. As a result, the net present value method is preferred.

REVIEW OF CONCEPTS AND TERMINOLOGY

LO 7

The following concepts and terms were introduced in this chapter:

Accounting rate-of-return method: A capital investment evaluation method designed to measure the estimated performance of a potential capital project. It is calculated by dividing the project's average annual net income by the average cost of the investment.

LO 4

Capital investment analysis: The process of making decisions about capital investments. It includes identifying the need for a capital investment, analyzing different courses of action to meet that need, preparing reports for managers, choosing the best alternative, and dividing funds among competing needs; also called *capital budgeting*.

- L0 4 Capital investment decisions:** Management decisions about when, where, and how much to spend on capital facilities and other long-term projects.
- L0 4 Carrying value:** The undepreciated portion of the original cost of a fixed asset.
- L0 5 Compound interest:** The interest cost for two or more periods when the amount on which interest is computed changes in each period to include all interest paid in previous periods.
- L0 4 Cost savings:** Benefits, such as reduced costs, from a proposed capital investment.
- L0 5 Future value:** The amount an investment will be worth at a future date if invested at compound interest.
- L0 2 Incremental analysis:** A technique used in decision analysis that compares alternatives by focusing on the differences in their projected revenues and costs; also called *differential analysis*.
- L0 5 Interest:** The cost associated with the use of money for a specific period of time.
- L0 3 Joint products:** Two or more products or services that are created simultaneously from a common direct material or input and cannot be identified as separate products until the split-off point in the process.
- L0 3 Make-or-buy analysis:** A decision analysis that helps management choose whether to make or buy some or all parts used in product assembly by identifying the costs of each alternative and their effects on existing revenues and costs.
- L0 1 Management decision cycle:** The five steps managers take in making decisions and following up on them.
- L0 4 Net cash inflows:** The balance of increases in projected cash receipts over increases in projected cash payments resulting from a proposed capital investment.
- L0 6 Net present value method:** A technique for evaluating capital investments in which all future cash flows for a proposed project are discounted to their present value, and the amount of the initial investment is subtracted from their sum. All capital investments are evaluated in the same way, and the projects with the highest net present value—the amount that exceeds the initial investment—can be selected for implementation.
- L0 2 Opportunity costs:** The revenues forfeited or lost when one alternative is chosen over another.
- L0 5 Ordinary annuity:** A series of equal payments or receipts that will begin one time period from the current date.
- L0 7 Payback period method:** A capital investment evaluation method that bases the decision to invest in a capital project on the minimum length of time it will take to get back in cash the amount of the initial investment.
- L0 5 Present value:** The amount that must be invested today at a given rate of compound interest to produce a given future value.
- L0 3 Product mix analysis:** A decision analysis designed to determine the most profitable combination of products or services when a company produces more than one product or offers more than one service and resources are constrained.
- L0 3 Sell or process-further analysis:** A decision analysis designed to help management determine whether to sell a product or process it further to increase its market price and profits.
- L0 1 Short-run decision analysis:** The systematic examination of any decision whose effects will be most felt over the next year or less.
- L0 5 Simple interest:** The interest cost for one or more periods when the amount on which the interest is computed (the principal) stays the same from period to period.
- L0 3 Special order analysis:** A decision analysis designed to help managers decide whether to accept or reject a special order for products at a price below the normal selling price.

- L03 Split-off point:** A specific point in the production or development process at which two or more joint products or services become separate and identifiable.
- L02 Sunk cost:** A cost that was incurred because of a previous decision and that cannot be recovered through the current decision.
- L05 Time value of money:** The concept that cash flows of equal dollar amounts separated by a time interval have different present values because of the effects of compound interest.

REVIEW PROBLEM

Capital Investment Analysis

- L04** The Roland Construction Company specializes in developing large shopping centers.
- L05** The company is considering the purchase of a new earth-moving machine and has gathered the following information:

L06	Purchase price	\$600,000
L07	Residual value	\$100,000
	Desired payback period	3 years
	Minimum rate of return	15%

The cash flow estimates are as follows:

Year	Cash Inflows	Cash Outflows	Net Cash Inflows	Projected Net Income
1	\$ 500,000	\$260,000	\$240,000	\$115,000
2	450,000	240,000	210,000	85,000
3	400,000	220,000	180,000	55,000
4	350,000	200,000	150,000	25,000
Totals	<u>\$1,700,000</u>	<u>\$920,000</u>	<u>\$780,000</u>	<u>\$280,000</u>

REQUIRED

- Analyze the Roland Construction Company's investment in the new earth-moving machine. In your analysis use (a) the net present value method, (b) the accounting rate-of-return method, and (c) the payback period method.
- Summarize your findings from 1 and recommend a course of action.

ANSWER TO REVIEW PROBLEM

- 1a. Net present value method (Factors are from Table 3 in the appendix on future value and present value tables.)

Year	Net Cash Inflows	Present-Value Factor	Present Value
1	\$240,000	.870	\$208,800
2	210,000	.756	158,760
3	180,000	.658	118,440
4	150,000	.572	85,800
4	100,000 (residual value)	.572	57,200
Total present value			\$629,000
Less cost of original investment			<u>600,000</u>
Net present value			<u>\$ 29,000</u>

- 1b. Accounting rate-of-return method

$$\begin{aligned}
 \text{Accounting Rate of Return} &= \frac{\text{Average Annual Net Income}}{\text{Average Investment Cost}} \\
 &= \frac{\$280,000 \div 4}{\left(\frac{\$600,000 - \$100,000}{2} \right) + \$100,000} \\
 &= \frac{\$70,000}{\$350,000} = \underline{\underline{20\%}}
 \end{aligned}$$

1c. Payback period method

Total cash investment		\$600,000
Less cash-flow recovery		
Year 1	\$240,000	
Year 2	210,000	
Year 3 (5% of \$180,000)	150,000	(600,000)
Unrecovered investment		<u>\$ 0</u>
Payback period: 2.833 (2 $\frac{5}{6}$) years, or 2 years 10 months		

2. Roland Construction Company: Summary of Decision Analysis

	Decision Measures	
	Desired	Predicted
Net present value	—	\$29,000
Accounting rate of return	15%	20%
Payback period	3 years	2.833 years

Based on the calculations in 1, the proposed investment in the earth-moving machine meets all company criteria for such investments. Given these results, the company should invest in the machine.

Chapter Assignments

BUILDING YOUR KNOWLEDGE FOUNDATION

QUESTIONS

- List some common types of short-run decisions that can be made during the executing stage of the management cycle.
- List qualitative factors that will influence a short-run decision.
- Describe the five steps of the management decision cycle.
- What is incremental analysis? What are some advantages of incremental analysis?
- When must decision analysis go beyond the comparison of quantitative information? What is the solution?
- What information must be included in a make-or-buy decision?
- What justifies excluding fixed manufacturing overhead costs from a special order analysis? When are fixed costs relevant to the special order decision?
- In product mix decisions, what criteria can be used to select products that will maximize operating income?
- Why are joint processing costs irrelevant to the decision to sell a product at split-off or process it further?
- Why is incremental analysis important to the sell or process-further decision?
- What is a capital investment? Give some examples of capital investments.
- Define *capital investment analysis*.
- Distinguish between cost savings and net cash inflows.
- Why is it important to know whether a capital investment will produce equal cash flows or unequal cash flows?
- Discuss the statement, "To treat all future income flows alike ignores the time value of money."
- "In using the net present value method, the carrying value of an asset is irrelevant, whereas current and future values are relevant." Is this statement valid? Why?
- When evaluating equipment replacement proposals under the net present value method, why is depreciation of the old equipment ignored?
- Which table in the appendix on future value and present value tables is used to determine the present value of a single sum to be received in the future? Which

table is used to determine the present value of a series of equal payments to be received in the future (ordinary annuity)? How is each table used in the net present value method?

19. How would you characterize the accounting rate-of-return method of capital investment analysis? List the advantages and disadvantages of this method.
20. What formula is used to determine payback period? Is this decision-making method very accurate? Defend your answer.

SHORT EXERCISES

LO 1 Qualitative and Quantitative Information in Short-Run Decision Analysis

SE 1. The owner of Le Chat Rouge, a French restaurant, is deciding whether to take Chicken Tarragon off the menu. Tell whether each of the following pieces of information is qualitative or quantitative. If the information is quantitative, specify whether it is financial or nonfinancial.

1. The time needed to prepare the chicken
2. The daily number of customers who order the chicken
3. Whether competing French restaurants have this entrée on the menu
4. The labor cost of the chef who prepares the chicken
5. The fact that the president of a nearby company, who brings ten guests with him each week, always orders Chicken Tarragon

LO 2 Incremental Analysis

SE 2. Fonseca Corporation has assembled the following information related to the purchase of a new automated degreasing machine. Using incremental analysis and only relevant information, compute the difference in favor of the Vogle machine.

	Harvey Machine	Vogle Machine
Increase in revenues	\$43,200	\$49,300
Increase in annual operating costs		
Direct materials	12,200	12,200
Direct labor	10,200	10,600
Variable manufacturing overhead	24,500	26,900
Fixed manufacturing overhead (including depreciation)	12,400	12,400

LO 3 Make-or-Buy Decision

SE 3. Zorich Company assembles products from a group of interconnecting parts. Some of the parts are produced by the company, and some are purchased from outside vendors. The vendor for Part 23X has just increased its price by 35 percent, to \$10 per unit for the first 5,000 units and \$9 per additional unit ordered each year. The company uses 7,500 units of Part 23X each year. Should the company continue to purchase the part, or should it begin making the part? Unit costs to make and sell the part are:

Direct materials	\$3.50
Direct labor	1.75
Variable manufacturing overhead	4.25
Variable selling costs for the assembled product	3.75

LO 3 Special Order Decision

SE 4. Bixler Company has received a special order for 1,000 units of Product YTZ at a selling price of \$20 per unit. This order is over and above normal production, and budgeted production and sales targets for the year have already been exceeded. Capacity exists to satisfy the special order. No selling costs will be incurred in connection with this order. Unit costs to manufacture and sell Product YTZ are as follows: Direct materials, \$7.60; direct labor, \$3.75; variable manufacturing overhead, \$9.25; fixed manufacturing costs, \$4.85; variable selling costs, \$2.75; and fixed general and administrative costs, \$6.75. Should Bixler Company accept the order?

LO 3 Sell or Process-Further Decision

SE 5. Perez Industries produces three products from a single operation. Product A sells for \$3 per unit, Product B sells for \$6 per unit, and Product C sells for \$9 per unit. When B is processed further, there are additional unit costs of \$3, and its new selling price is \$10 per unit. Each product is allocated \$2 of joint costs from the initial production operation. Should Product B be processed further, or should it be sold at the end of the initial operation?

- LO 4 Capital Investment Analysis and Revenue Measures** **SE 6.** Matsuki Corp. is analyzing a proposal to purchase a computer-integrated boring mill. The machine will be able to produce an entire product line in a single operation. Projected annual net cash inflows from the machine are \$180,000, and projected operating income is \$120,000.
Why is projected operating income lower than projected net cash inflows? Identify possible causes for the \$60,000 difference.
- LO 5 Time Value of Money** **SE 7.** Your Aunt Harriet recently inherited a trust fund from a distant relative. On January 2, the bank managing the trust fund notified Aunt Harriet that she has the option of receiving a lump-sum check for \$175,500 or leaving the money in the trust fund and receiving an annual year-end check for \$20,000 for each of the next 20 years. Aunt Harriet likes to earn at least an 8 percent return on her investments. What should Aunt Harriet do?
- LO 6 Capital Investment Decision** **SE 8.** Swift Communications, Inc., is considering the purchase of a new piece of computerized data transmission equipment. Estimated annual net cash inflows for the new equipment are \$575,000. The equipment costs \$2 million, has a five-year estimated useful life, and will have no residual value at the end of the five years. The company has a minimum rate of return of 12 percent. Compute the net present value of the equipment. Should the company purchase it?
- LO 7 Capital Investment Decision: Accounting Rate-of-Return Method** **SE 9.** Quick Cleaners is considering an investment in a delivery truck that will cost \$29,000; it will last six years and will have an estimated residual value of \$5,000. It is estimated that the average net income from this delivery service will be \$4,000. Quick's owners seek to earn an accounting rate of return of 20 percent. Compute the average investment cost and the accounting rate of return. Should the investment be made?
- LO 7 Capital Investment Decision: Payback Period Method** **SE 10.** Joseph Communications, Inc., is considering an investment of \$2 million to purchase equipment to launch an Internet site that is expected to yield an annual cash flow of \$575,000. Compute the payback period of the equipment. Does this method yield a positive or negative response to the proposal to buy the equipment, assuming the company sets a maximum payback period of four years?

EXERCISES

- LO 1 Steps in the Management Decision Cycle** **E 1.** Troy Corrente owns Corrente's Department Store in Salt Lake City. The store's profits had declined, so Corrente had to decide how to remedy the situation. Number the actions below 1 through 5 to indicate the order in which Corrente would have performed them.
- Corrente decided to close the Cosmetics Department.
 - Corrente realized that the store's declining profits may have been due to the poor sales performance of one or more departments.
 - Corrente reviewed the profitability in each department and found that profits in the Women's Clothing Department had dropped. The sales clerks suggested that closing the Cosmetics Department had reduced the flow of traffic into their department.
 - Corrente gathered monthly sales and expense information directly related to each department in the store. He noticed that the Cosmetics Department was operating at a loss.
 - Corrente believed that he would have to decide whether to keep or drop an unprofitable department.
- LO 2 Incremental Analysis** **E 2.** Carol Bezner, the business manager for Chesney Industries, must select a new computer and word processing package for her secretary. Rental of Model A, which is similar to the model now being used, is \$3,200 per year. Model B is a deluxe computer that rents for \$3,900 per year and will require a new desk for the secretary. The annual desk rental charge is \$750. The secretary's salary of \$1,200 per month will not change. If Model B is rented, \$280 in annual software training costs will be incurred. Model B has greater capacity and is expected to save \$2,550 per year in part-time secretarial wages. Upkeep and operating costs will not differ between the two models.
- Identify the relevant data in this problem.
 - Prepare an incremental analysis to aid the business manager in her decision.

LO 3 Make-or-Buy Decision

- E 3.** One component of a radio produced by Retic Audio Systems, Inc., is currently being purchased for \$210 per 100 parts. Management is studying the possibility of manufacturing that component. Annual production (usage) at Retic is 70,000 units; fixed costs (all of which remain the same whether the part is made or purchased) are \$38,500; and variable costs are \$.90 per unit for direct materials, \$.50 per unit for direct labor, and \$.60 per unit for manufacturing overhead.

Using incremental analysis, decide whether Retic Audio Systems, Inc., should manufacture the part or continue to purchase it from an outside vendor.

LO 3 Special Order Decision

- E 4.** Olga Antiquities, Ltd., produces antique-looking lampshades. Management has just received a special order for 1,000 shades and must decide whether to accept it. Shishkova Furniture Company, the purchaser, is offering to pay \$22.00 per shade and shipping costs. The variable production costs per shade include \$9.20 for direct materials, \$4.00 for direct labor, and \$3.80 for variable manufacturing overhead. The current year's production is 20,000 shades, and maximum capacity is 25,000 shades. Fixed costs, including manufacturing overhead, advertising, and selling and administrative costs total \$70,000. The usual selling price is \$30.00 per shade. Shipping costs average \$3.00 per shade.

Determine whether Olga Antiquities should accept the special order.

LO 3 Product Mix Decision

- E 5.** Brunner, Inc., manufactures two products that require both machine processing and labor operations. Because there is unlimited demand for both products, Brunner could devote all its capacities to a single product. Unit prices, cost data, and processing requirements are:

	Product A	Product M
Unit selling price	\$95	\$250
Unit variable costs	\$55	\$120
Machine hours per unit	0.4	1.4
Labor hours per unit	2	6

In 20x2 the company will be limited to 160,000 machine hours and 120,000 labor hours.

1. Compute the most profitable combination of products to be produced in 20x2.
2. Compute the contribution margin for the total product volume computed in 1.

LO 3 Sell or Process-Further Decision

- E 6.** Quality Meats, in an attempt to provide superb customer service, is considering the expansion of its product offerings from whole hams and turkeys to complete ham and turkey dinners. Each dinner would include a carved ham or turkey, two side dishes, and six rolls or cornbread. The store's accountant has compiled the following relevant information:

Product	Sales Revenue, No Additional Service	Sales Revenue if Processed Further	Additional Processing Costs
Ham	\$30	\$50	\$15
Turkey	20	35	15

A cooked, uncarved ham costs Quality Meats \$20 to produce. A cooked, uncarved turkey costs \$15 to prepare. Use incremental analysis to determine which products Quality Meats should offer.

LO 5 Using the Present Value Tables

- E 7.** For each of the following situations, identify the correct factor to use from the tables in the appendix on future value and present value tables, and compute the appropriate present value.

1. Annual net cash inflows of \$35,000 for five years, discounted at 16%
2. An amount of \$25,000 to be received at the end of ten years, discounted at 12%
3. The amount of \$28,000 to be received at the end of two years, and \$15,000 to be received at the end of years 4, 5, and 6, discounted at 10%
4. Annual net cash inflows of \$22,500 for twelve years, discounted at 14%

5. The following five years of cash inflows, discounted at 10%:

Year 1	\$35,000
Year 2	20,000
Year 3	30,000
Year 4	40,000
Year 5	50,000

6. The amount of \$70,000 to be received at the beginning of year 7, discounted at 14%

E 8.
LO 5 Present Value Computations

Two machines—Machine N and Machine O—are being considered in a replacement decision. Both machines have about the same purchase price and an estimated ten-year life. The company uses a 12 percent minimum rate of return as its acceptance-rejection standard. Following are the estimated net cash inflows for each machine.

Year	Machine N	Machine O
1	\$12,000	\$17,500
2	12,000	17,500
3	14,000	17,500
4	19,000	17,500
5	20,000	17,500
6	22,000	17,500
7	23,000	17,500
8	24,000	17,500
9	25,000	17,500
10	20,000	17,500
Residual value	14,000	12,000

1. Compute the present value of future cash flows for each machine, using Tables 3 and 4 in the appendix on future value and present value tables.
2. Which machine should the company purchase, assuming that both involve the same capital investment?

E 9.
LO 6 Capital Investment Decision:
Net Present Value Method

Petrol Service Station is planning to invest in car wash equipment valued at \$250,000. The owner estimates that the equipment will increase annual net cash inflows by \$46,000. The equipment is expected to have a ten-year useful life with an estimated residual value of \$50,000. The company requires a 14 percent minimum rate of return.

Using the net present value method, prepare an analysis to determine whether the company should purchase the equipment. How important is the estimate of residual value to this decision? Use Tables 3 and 4 in the appendix on future value and present value tables.

E 10.
LO 6 Capital Investment Decision:
Net Present Value Method

Jefferson and Associates wants to buy an automatic extruding machine. The equipment would have a useful life of six years, cost \$220,000, and increase annual net cash inflows by \$57,500. Assume there is no residual value at the end of six years. The company's minimum rate of return is 14 percent.

Using the net present value method, prepare an analysis to determine whether the company should purchase the machine. Use Tables 3 and 4 in the appendix on future value and present value tables.

E 11.
LO 7 Capital Investment Decision:
Accounting Rate-of-Return Method

Heber Corporation manufactures metal hard hats for construction workers. Recently, management has tried to raise productivity to meet the growing demand from the real estate industry. The company is now thinking about buying a new stamping machine. Management has decided that only capital investments that yield at least a 14 percent return will be accepted. The new machine would cost \$325,000, revenue would increase by \$98,400 per year, the residual value of the new machine would be \$32,500, and operating cost increases (including depreciation) would be \$74,600 per year.

Using the accounting rate-of-return method, decide whether the company should invest in the machine. (Show all computations to support your decision.)

E 12.
LO 7 Capital Investment Decision:
Payback Period Method

Super Sounds, Inc., a manufacturer of stereo speakers, is thinking about adding a new injection molding machine. The machine could produce speaker parts that the company now buys from outsiders. The machine has an estimated life of 14 years and will

cost \$425,000. Gross cash revenue from the machine will be about \$400,000 per year, and related cash expenses should total \$310,050. The payback period should be five years or less. Use the payback period method to determine whether the company should invest in the new machine. Show computations to support your answer.

PROBLEMS

LO 3 Make-or-Buy Decision



- P 1.** The Iron Refrigerator Company purchases and installs defrost clocks in its products. The clocks cost \$144 per case, and each case contains twelve clocks. The supplier recently gave advance notice that, effective in 30 days, the price will rise by 50 percent. The company has idle equipment that, with only a few minor changes, could be used to produce similar defrost clocks.

Cost estimates have been prepared under the assumption that the company could make the product itself. Direct materials would cost \$9.00 per clock. Direct labor would be 10 minutes per clock at a labor rate of \$12.00 per hour. Variable manufacturing overhead would be \$6.50 per clock. Fixed manufacturing overhead, which would be incurred under either alternative, would be \$32,420 a year for depreciation and \$234,000 a year for other costs. Production and usage are estimated at 75,000 clocks a year. (Assume that idle equipment cannot be used for any other purpose.)

REQUIRED

1. Prepare an incremental analysis to determine whether the defrost clocks should be made within the company or purchased from the outside supplier at the higher price.
2. Compute the total unit cost to make one clock and to buy one clock after the price hike.

LO 3 Special Order Decision



- P 2.** On March 26, Barca Industries received a special order request for 150 ten-foot aluminum fishing boats. Operating on a fiscal year ending May 31, the division already has orders that will allow it to produce at budget levels for the period. However, extra capacity exists that could be used to produce the additional 150 boats.

The terms of the special order call for a selling price of \$625 per boat, and the customer will pay all shipping costs. No sales personnel were involved in soliciting the order.

The ten-foot fishing boat has the following cost estimates: direct materials, aluminum, two 4' × 8' sheets at \$145 per sheet; direct labor, 14 hours at \$14.50 per hour; variable manufacturing overhead, \$5.75 per direct labor hour; fixed manufacturing overhead, \$4.50 per direct labor hour; variable selling expenses, \$46.50 per boat; and variable shipping expenses, \$57.50 per boat.

REQUIRED

Prepare an incremental analysis for management to use in deciding whether to accept or reject the special order. What decision should be made?

LO 3 Sell or Process-Further Decision



- P 3.** All-Bagels, Inc., produces and sells 20 types of bagels by the dozen. Bagels are priced at \$6.00 per dozen and cost \$.20 per unit to produce. The company is considering further processing the bagels into two products: bagels with cream cheese and bagel sandwiches. It would cost an additional \$.50 per unit to produce bagels with cream cheese, but the new selling price would be \$2.50 each. It would cost an additional \$1.00 per sandwich to produce bagel sandwiches, but the new selling price would be \$3.50 each.

REQUIRED

1. Identify the relevant per-unit costs and revenues for the alternatives.
2. Based on the information in 1, should All-Bagels, Inc., expand its product offerings?
3. Suppose that All-Bagels, Inc., did expand its product line to include bagels with cream cheese and bagel sandwiches. Based on customer feedback, the company determined that it could further process those two products into bagels with fruit and cream cheese and bagel sandwiches with cheese. The company's accountant compiled the following information:

Product (per unit)	Sales Revenue if Sold with No Further Processing	Sales Revenue if Processed Further	Additional Processing Costs
Bagels with cream cheese	\$2.50	\$3.50	Fruit: \$1.00
Bagel sandwiches	\$3.50	\$4.50	Cheese: \$.50

Perform an incremental analysis to determine if All-Bagels, Inc., should process its products further. Explain your findings.

P 4.

**LO 6 Capital Investment Decision:
Net Present Value Method**



The management of Toughware Plastics has been looking at a proposal to purchase a new plastic injection-style molding machine. With the new machine, the company would not have to buy small plastic parts to use in production. The estimated useful life of the machine is 15 years, and the purchase price, including all setup charges, is \$400,000. Residual value is estimated to be \$40,000. The net addition to the company's cash inflows due to the savings from making the parts is estimated to be \$70,000 a year. Toughware Plastic's management has decided on a minimum rate of return of 14 percent. Use Tables 3 and 4 in the appendix on future value and present value tables.

REQUIRED

1. Using the net present value method, determine if the company should purchase the machine. Support your answer.
2. If management had decided on a minimum rate of return of 16 percent, should the machine be purchased? Show all computations to support your answer.

P 5.

**LO 7 Accounting Rate-of-Return
and Payback Period
Methods**



The Quoque Company is expanding its production facilities to include a new product line, a sporty automotive tire rim. Using new computerized machinery, tire rims can now be produced with little labor cost. The controller has advised management about two such machines. The details about each machine follow.

	Cal Machine	Hawk Machine
Cost of machine	\$500,000	\$550,000
Residual value	50,000	55,000
Net income	34,965	40,670
Annual net cash inflows	91,215	90,170

The minimum rate of return is 12 percent. The maximum payback period is six years. (Where necessary, round calculations to the nearest dollar.)

REQUIRED

1. For each machine, compute the projected accounting rate of return.
2. Compute the payback period for each machine.
3. From the information generated in 1 and 2, which machine should be purchased? Why?

ALTERNATE PROBLEMS

P 6.

LO 3 Make-or-Buy Decision



The Shoshone Furniture Company is famous for its dining room furniture. One full department is engaged in the production of the Cottonwood line, an elegant but affordable dining room set. To date, the company has been manufacturing all pieces of the set, including the six chairs.

Management has just received word that a company in Durango, Colorado, is willing to produce the chairs for Shoshone at a total purchase price of \$3,000,000 for the annual demand. Company records show that the following costs have been incurred in the production of the chairs: wood materials, \$22.50 per chair; cloth materials, \$8.50 per chair; direct labor, 1.2 hours per chair at \$12.00 per hour; variable manufacturing overhead, \$5.00 per direct labor hour; fixed manufacturing overhead, depreciation, \$135,000; and fixed manufacturing overhead, other, \$109,400. Fixed manufacturing overhead would continue whether or not the chairs are produced. Assume that idle facilities cannot be used for any other purpose and that annual usage is 60,000 chairs.

REQUIRED

1. Prepare an incremental analysis to determine whether the chairs should be made by the company or purchased from the outside supplier in Durango.
2. Compute the variable unit cost to make one chair and to buy one chair.

P 7.

**LO 6 Capital Investment Decision:
Net Present Value Method**

Le Filet is a famous restaurant in the French Quarter of New Orleans. "Bouillabaisse Nadia" is the house specialty. Management is currently considering the purchase of a machine that would prepare all the ingredients, automatically mix them, and cook the dish to the restaurant's specifications. The machine will function for an estimated 12 years, and the purchase price, including installation, is \$250,000. Estimated residual



REQUIRED

LO 6 Comprehensive Capital
LO 7 Investment Decision


value is \$25,000. This labor-saving device is expected to increase cash flows by an average of \$42,000 per year during its estimated useful life. For capital investment decisions, the restaurant uses a 12 percent minimum rate of return.

Use Tables 3 and 4 in the appendix on future value and present value tables.

1. Using the net present value method, determine if the company should purchase the machine. Support your answer.
2. If management had decided on a minimum rate of return of 14 percent, should the machine be purchased? Show all computations to support your answer.

P 8. Gonzalez Corporation wants to buy a new rubber-stamping machine. The machine will provide the company with a new product line: pressed rubber food trays for kitchens. Two machines are being considered; the data for each machine follow.

	Exalt Machine	Landis Machine
Cost of machine	\$350,000	\$370,000
Net income	39,204	48,642
Annual net cash inflows	64,404	75,642
Residual value	28,000	40,000
Estimated useful life in years	10	10

The company's minimum rate of return is 16 percent, and the maximum allowable payback period is 5.0 years.

REQUIRED

1. Compute the net present value for each machine.
2. Compute the projected accounting rate of return for each machine.
3. Compute the payback period for each machine.
4. Based on the information in 1, 2, and 3, which machine should be purchased? Why?

EXPANDING YOUR CRITICAL THINKING, COMMUNICATION, AND INTERPERSONAL SKILLS

SKILLS DEVELOPMENT

Conceptual Analysis

SD 1.
LO 1 Management Decision Cycle


Two weeks ago your cousin Jonathan moved from New York City to Houston. He has found that he needs a car to drive to work and to run errands. He has no experience in selecting a car, so he has asked for your help.

Using the management decision cycle presented in this chapter, write him a letter explaining how he can approach making this decision.

How would your response change if the president of your company asked you to help make a decision about acquiring a fleet of cars for use by sales personnel?

SD 2.
LO 2 Identification of Sunk Costs and Opportunity Costs


Motorola Inc. originated a \$5 billion project, called Iridium, that launched 66 low earth orbiting satellites for global communication using pagers and mobile phones. From the beginning, the Iridium project had technical and marketing problems. Instead of the 600,000 subscribers it was expected to have, it had only 55,000. A basic problem with the system was that a subscriber had to buy a mobile phone that cost \$3,000



Communication



Critical Thinking



Ethics

Group
ActivityHot Links
to Real Companies

International



Internet



Memo



Spreadsheet

and weighed more than one pound. Few potential users wanted to do this. As a result, Iridium had to file for bankruptcy. Motorola, which had an 18 percent ownership of Iridium, had invested \$1.6 billion, and had to decide if it was willing to invest more in an effort to save the project. Some investors wanted to see Motorola cut its losses and move on. Others were concerned about recouping the enormous expenditure that had already been made. What are sunk costs and how do they differ from opportunity costs? How do these concepts apply to the decision by Motorola's management to continue or discontinue support for the Iridium Project?⁶

Ethical Dilemma

SD 3.

Karen Gore is the assistant controller for *Railing Corp.*, a leading producer of home appliances. Her friend Ed Jason is the supervisor of the Cookware Department. Jason has the authority to decide whether parts are purchased from outside vendors or manufactured in his department. Gore recently conducted an internal audit of the parts being manufactured in the Cookware Department, including a check of the prices currently charged by vendors for similar parts. She found over a dozen parts that could be purchased for less than they cost the company to produce. When she approached Jason about the situation, he replied that if those parts were purchased from outside vendors, two automated machines would be idled for several hours a week. Increased machine idle time would have a negative effect on his performance evaluation and could reduce his yearly bonus. He reminded Gore that he was in charge of the decision to make or purchase those parts and asked her not to pursue the matter any further.

What should Gore do in this situation? Discuss her options.

Research Activity

SD 4.

Computers are important in today's business world. Every business can benefit from computers' capabilities, which include rapid data processing, timely report generation, automated accounting systems, and the use of specialized software packages for such areas as payroll, accounts receivable, accounts payable, and tax return preparation. Make a trip to a local computer retailer. Inquire about the various types of computers available and identify one that would be useful to a local nursery selling landscape plants and gardening supplies and equipment. Find out the cost of this computer. Make notes of the model name, its special features and capabilities, and its cost. After gathering those data, identify the benefits that the nursery's controller would include in an analysis to justify the purchase of the computer. Describe the effect of each benefit on cash flows and profitability. Be prepared to discuss your findings in class.

Decision-Making Practice

SD 5.

The *McCall Hotel Syndicate* owns four resort hotels in Europe. Because the Paris operation has been booming over the past five years, management has decided to build an addition. The proposed wing, which will increase the hotel's capacity by 20 percent, can be built at a cost of \$30,000,000. The new structure will have an increased residual value of \$3,000,000.

Erin McVan, the controller, has started an analysis of the net present value for the project. She has calculated the annual net cash inflows by subtracting the increase in cash operating expenses from the increase in cash inflows from room rentals.

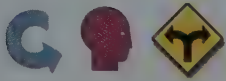
Year	Net Cash Inflows
1–20 (each year)	\$3,900,000

Capital investment projects must generate a 12 percent minimum rate of return to qualify for consideration.

Using net present value analysis, evaluate the proposal and make a recommendation to management. Explain how your recommendation would change if management were willing to accept a 10 percent minimum rate of return. Use Tables 3 and 4 in the appendix on future value and present value tables.

Group Activity: Have students work in groups to complete SD 5. Select one person from each group to report the group's findings to the class.

LO 3 Ethics of a Make-or-Buy Decision



LO 6 Capital Investment Decision

LO 7



LO 5 Using Net Present Value

LO 6



MANAGERIAL REPORTING AND ANALYSIS

Interpreting Management Reports

MRA 1

Roscoe Can Opener Company is a subsidiary of *Boedigheimer Appliances, Inc.* The can opener Roscoe produces is in strong demand. Sales during the present year, 20x2, are expected to hit 1,000,000 units. Full plant capacity is 1,150,000 units, but 1,000,000 units is considered normal capacity for the current year. The following unit price and cost breakdown is applicable in 20x2:

	Per Unit
Sales price	\$22.50
Less manufacturing costs	
Direct materials	\$6.00
Direct labor	2.50
Overhead: Variable	3.50
Fixed	1.50
Total manufacturing costs	\$13.50
Gross margin	\$ 9.00
Less selling and administrative expenses	
Selling: Variable	\$ 1.50
Fixed	1.00
Administrative, fixed	1.25
Packaging, variable*	.75
Total selling and administrative expenses	\$ 4.50
Operating income	\$ 4.50

*Three types of packaging are available: deluxe, \$.75/unit; plain, \$.50/unit; and bulk pack, \$.25/unit.

During November, the company received three requests for special orders from large chain-store companies. Those orders are not part of the budgeted 1,000,000-unit sales for 20x2, but company officials think that sufficient capacity exists for one order to be accepted. The orders received and their terms are:

- Order 1: 75,000 can openers @ \$20.00 per unit, deluxe packaging
- Order 2: 90,000 can openers @ \$18.00 per unit, plain packaging
- Order 3: 125,000 can openers @ \$15.75 per unit, bulk packaging

Because the orders were placed directly with company officials, no variable selling costs will be incurred.

REQUIRED

1. Analyze the profitability of each of the three special orders.
2. Which special order should be accepted?

Formulating Management Reports

MRA 2

Quality work and timely output are the distinguishing characteristics of *Rock Photo, Inc.* Rock Photo is a nationally franchised company with over 50 outlets located in the southern states. Part of the franchise agreement promises a centralized photo developing process with overnight delivery to the outlets.

Because of the tremendous increase in demand for its photo processing, Emma Dubois, the corporation's president, is considering the purchase of a new, deluxe processing machine by the end of this month. Dubois wants you to formulate a memo showing your evaluation. Your memo will be presented to the board of directors' meeting next week.

LO 3 Special Order Decision



LO 4 Evaluating a Capital LO 5 Investment Proposal



According to your research, the new machine will cost \$320,000. The machine will function for an estimated five years and should have a \$32,000 residual value. All capital investments are expected to produce a 20 percent minimum rate of return, and the investment should be recovered in three years or less. All fixed assets are depreciated using the straight-line method. The forecasted increases in operating results for the new machine are as follows:

Year	Cash Flow Estimates	
	Cash Inflows	Cash Outflows
1	\$310,000	\$210,000
2	325,000	220,000
3	340,000	230,000
4	300,000	210,000
5	260,000	180,000

REQUIRED

- In preparation for writing your memo, answer the following questions.
 - What kinds of information do you need to prepare this memo?
 - Why is the information relevant?
 - Where would you find the information?
 - When would you want to obtain the information?
- Analyze the purchase of the machine and decide if the company should purchase it. Use (a) the net present value method, (b) the accounting rate-of-return method, and (c) the payback period method.

International Company**MRA 3.**

The board of directors of the *Tanashi Corporation* met to review a number of proposed capital investments that would improve the quality of company products. One production line manager requested the purchase of new computer-integrated machines to replace the older machines in one of the ten production departments at the Tokyo plant.

Although the production line manager had presented quantitative information to support the purchase of the new machines, the board members asked the following important questions:

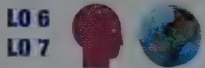
- Why do we want to replace the old machines? Have they deteriorated? Are they obsolete?
- Will the new machines require less cycle time?
- Can we reduce inventory levels or save floor space by replacing the old machines?
- How expensive is the software used with the new machines?
- Will we be able to find highly skilled employees to maintain the new machines? Or can we find workers who are trainable? What would it cost to train those workers? Would the training disrupt the staff by causing relocations?
- Would the implementation of the machines be delayed because of the time required to recruit new workers?
- How would the new machines affect other parts of the manufacturing systems? Would the company lose some of the flexibility in its manufacturing systems if it introduced the new machines?

The board members believe that the qualitative information needed to answer their questions could lead to the rejection of the project, even though it would have been accepted based on the quantitative information.

REQUIRED

- Identify the questions that can be answered with quantitative information. Give examples of the quantitative information that could be used.
- Identify the questions that can be answered with qualitative information. Explain why such information could negatively influence the capital investment decision even though the quantitative information suggests a positive outcome.

LO 1 Using Qualitative
LO 2 Information in Capital
LO 4 Investment Decisions



LO 3 Sell or Process-Further Decision in a Service Organization



MRA 4.

Excel Spreadsheet Analysis

Maya Marketeers, Inc., has developed a promotional program for a large shopping center in Tempe, Arizona. After investing \$360,000 in developing the original promotion campaign, the firm has received an offer from its client for an add-on contract that includes the original promotion areas of (1) TV advertising program, (2) series of brochures for mass mailing, and (3) special rotating BIG SALE schedule for 10 of the 28 tenants in the shopping center. Following are the revenue terms from the original contract with the shopping center and the offer for an add-on contract, which extends the original contract terms.

	Contract Terms	
	Original Contract Terms	Extended Contract Including Add-On Terms
TV advertising campaign	\$520,000	\$ 580,000
Brochure package	210,000	230,000
Rotating BIG SALE schedule	170,000	190,000
Totals	<u>\$900,000</u>	<u>\$1,000,000</u>

Maya estimates that the following additional costs will be incurred by extending the contract:

	TV Campaign	Brochures	BIG SALE Schedule
Direct labor	\$30,000	\$ 9,000	\$7,000
Variable overhead	22,000	14,000	6,000
Fixed overhead*	12,000	4,000	2,000

*80 percent are fixed costs applied to this contract.

REQUIRED

- Using an Excel spreadsheet, compute the costs that will be incurred for each part of the add-on portion of the contract.
- Should Maya Marketeers, Inc., accept the add-on contract, or should it ask for a final settlement check based on the original contract only? Defend your answer.
- Assuming Maya wants to continue working with the client, how should it counter-offer for the add-on contract?

Internet Case

MRA 5.

LO 6 Comparison of Capital
LO 7 Investment Disclosures by Two Large Companies



Companies vary in the amount of information they disclose about their criteria for selecting capital investments. Through the Needles Accounting Resource Center web site at <http://college.hmco.com>, access the web sites for International Paper Company and The Coca-Cola Company. Find management's discussion and analysis also called (financial review), which precedes the presentation of the financial statements. In that section, find the discussion of investments. Which company provides the more in-depth discussion? Do either or both disclose their criteria for making capital investment decisions? Also, look at the investing activities listed in the statement of cash flows for each company. What is the extent of capital expenditures for each company? Compare each company's capital investments with the amount of total assets on the balance sheet. Which company is more of a growth company? Explain.

ENDNOTES

1. Data Warehousing Institute, *Data Warehousing: What Works?* Volume 4. Gaithersburg, Md.: Data Warehousing Institute, 1997.
2. From Roger B. Smith, "Ethics in Business: An Essential Element of Success," *Management Accounting*, June 1990. Reprinted by permission of the Institute of Management Accountants.
3. From a speech by Jim Croft, vice president of finance and administration of the Field Museum, Chicago, November 14, 2000.
4. Wayne Arnold, "High-Tech Hopes in Asia May Be Laid Low," *The Wall Street Journal*, November 5, 1997.
5. Steve Coburn, Hugh Grove, and Tom Cook, "How ABC Was Used in Capital Budgeting," *Management Accounting*, Institute of Management Accountants, May 1997.
6. "The Ball and Chain," *Wireless Week*, June 21, 1999; and "Iridium to Be Reborn Relatively Debt-Free?" *Newsbytes New Network*, August 19, 1999.

APPENDIX A

International Accounting

As businesses grow, they naturally look for new sources of supply and new markets in other countries. Today, it is common for businesses, called *multi-national* or *transnational corporations*, to operate in more than one country, and many of them operate throughout the world. Table 1 shows the extent of the foreign business of four of the largest U.S. corporations. IBM, for example, has operations in 80 countries and receives almost 60 percent of its sales from outside the United States. Other industrial countries, such as Switzerland, France, Germany, Great Britain, the Netherlands, and Japan, have also given rise to numerous worldwide corporations. For example, 98 percent of the sales of Nestlé, the large Swiss food company, are made outside Switzerland. Examples of companies that receive more than half of their sales from outside their home countries are Michelin, the French tire maker; Unilever, the British/Netherlands consumer products company; and Sony, the Japanese electronics company. More than 500 companies are listed on at least one stock exchange outside their home country.

In addition, sophisticated investors no longer restrict their investment activities to domestic securities markets. Many Americans invest in foreign securities markets, and non-Americans invest heavily in the stock market in the United States. Figure 1 shows that from 1980 to 1997, the total value of securities traded on the world's stock markets increased over 18-fold, with the U.S. share of the pie declining from 55 to 52 percent. During the same period, emerging markets in the rest of the world increased from 16 to 26 percent.

Foreign business transactions have two major effects on accounting. First, most sales or purchases of goods and services in other countries involve different currencies. Thus, one currency needs to be translated into another, using exchange rates.¹ An *exchange rate* is the value of one currency in terms of another. For example, an English company purchasing goods from a U.S. company and paying in U.S. dollars must exchange British pounds for U.S. dollars before making payment. In effect, currencies are goods

Table 1. Extent of Foreign Revenues for Selected U.S. Companies

Company	Foreign Revenues (millions)	Total Revenues (millions)	Foreign Revenues (percentage)
Exxon	\$80,708	\$100,697	80.1
IBM	46,364	81,667	56.8
Ford	43,819	144,416	30.3
General Motors	40,918	132,863	30.8

Source: "The 100 Largest U.S. Multinationals," *Forbes*, July 27, 1999. Reprinted by permission of *Forbes* Magazine © 1999 *Forbes*.

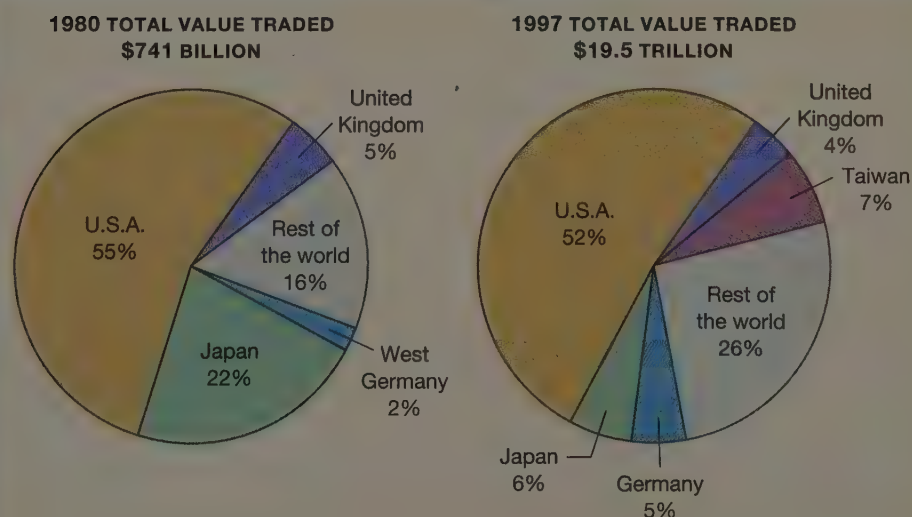
that can be bought and sold. Table 2 lists the exchange rates of several currencies in terms of dollars. It shows the exchange rate for the British pound as \$1.438 per pound on a particular date. Like the price of any good or service, these prices change daily according to supply and demand for the currencies. Accounting for these price changes in recording foreign transactions and preparing financial statements for foreign subsidiaries is discussed in the next two sections.

The second major effect of international business on accounting is that financial standards differ from country to country, which makes it difficult to compare companies from different countries. The obstacles to achieving comparability and some of the progress in solving the problem are discussed later in this chapter.

Accounting for Transactions in Foreign Currencies

Among the first activities of an expanding company in the international market are the buying and selling of goods and services. For example, a U.S. maker of precision tools may expand by selling its product to foreign customers. Or it might lower its

Figure 1
Value of Securities Traded on
the World's Stock Markets



Source: International Finance Corporation, *Emerging Stock Markets Factbook*, © 1998.

Table 2. Partial Listing of Foreign Exchange Rates

Country	Price in \$ U.S.	Country	Price in \$ U.S.
Australia (dollar)	0.559	Hong Kong (dollar)	0.128
Brazil (real)	0.550	Japan (yen)	0.009
Britain (pound)	1.438	Mexico (peso)	0.10
Canada (dollar)	0.677	Russia (ruble)	0.359
Europe (euro)	0.871	Singapore (dollar)	0.577

Source: Data from *The Wall Street Journal*, September 7, 2000.

product cost by buying a less expensive part from a source in another country. In previous chapters, all transactions were recorded in dollars, and it was assumed that the dollar is a uniform measure in the same way that the inch and the centimeter are. But in the international marketplace, a transaction may take place in Japanese yen, British pounds, or some other currency. The values of these currencies in relation to the dollar rise and fall daily. If there is a delay between the date of sale or purchase and the date of receipt or payment of cash, the amount of cash involved may be different from that originally agreed upon due to changing exchange rates.

FOREIGN SALES When a domestic company sells merchandise abroad, it may bill either in its own country's currency or in the foreign currency. If the billing and the subsequent payment are both in the domestic currency, no accounting problem arises. For example, assume that the precision toolmaker sells \$160,000 worth of tools to a British company and bills the British company in dollars. The entry to record the sale and receipt is familiar:

Date of Sale			
A = L + OE	Accounts Receivable, British company	160,000	
+ +	Sales		160,000
Date of Receipt			
A = L + OE	Cash	160,000	
+ -	Accounts Receivable, British company		160,000

However, if the U.S. company bills the British company in British pounds and accepts payment in pounds, the U.S. company may incur an *exchange gain or loss*. A gain or loss will occur if the exchange rate between dollars and pounds changes between the date of sale and the date of receipt. Since gains and losses tend to offset one another, a single account is used during the year to accumulate the activity. The net exchange gain or loss is reported on the income statement. For example, assume that the sale of \$160,000 above was billed as £100,000, reflecting an exchange rate of 1.60 (that is, \$1.60 per pound) on the sale date. Now assume that by the date of receipt, the exchange rate has fallen to 1.50. The entries to record the transactions follow:

Date of Sale			
A = L + OE	Accounts Receivable, British company	160,000	
+ +	Sales		160,000
	£100,000 × \$1.60 = \$160,000		

		Date of Receipt	
A = L + OE	Cash	150,000	
+ -	Exchange Gain or Loss	10,000	
-	Accounts Receivable, British company		160,000
	$\text{£}100,000 \times \$1.50 = \$150,000$		

The U.S. company has incurred an exchange loss of \$10,000 because it agreed to accept a fixed number of British pounds in payment, and the value of each pound dropped before the payment was made. Had the value of the pound in relation to the dollar increased, the U.S. company would have made an exchange gain.

FOREIGN PURCHASES Purchases are the opposite of sales. The same logic applies to them, except that the relationship of exchange gains and losses to changes in exchange rates is reversed. For example, assume that the maker of precision tools purchases \$15,000 of a certain part from a Japanese supplier. If the purchase and subsequent payment are made in U.S. dollars, no accounting problem arises.

		Date of Purchase	
A = L + OE	Purchases	15,000	
+ -	Accounts Payable, Japanese company		15,000

		Date of Payment	
A = L + OE	Accounts Payable, Japanese company	15,000	
- -	Cash		15,000

However, the Japanese company may bill the U.S. company in yen and be paid in yen. If so, the U.S. company will incur an exchange gain or loss if the exchange rate changes between the date of purchase and the date of payment. For example, assume that the transaction is for 2,500,000 yen and the exchange rates on the dates of purchase and payment are \$.0090 and \$.0085 per yen, respectively. The entries follow.

		Date of Purchase	
A = L + OE	Purchases	22,500	
+ -	Accounts Payable, Japanese company		22,500
	$\text{¥}2,500,000 \times \$0.0090 = \$22,500$		

		Date of Payment	
A = L + OE	Accounts Payable, Japanese company	22,500	
- - +	Exchange Gain or Loss		1,250
	Cash		21,250
	$\text{¥}2,500,000 \times \$0.0085 = \$21,250$		

In this case the U.S. company received an exchange gain of \$1,250 because it agreed to pay a fixed ¥2,500,000, and between the dates of purchase and payment the exchange value of the yen decreased in relation to the dollar.

REALIZED VERSUS UNREALIZED EXCHANGE GAIN OR LOSS The preceding illustration dealt with completed transactions (in the sense that payment was completed). In each case, the exchange gain or loss was recognized on the date of receipt or payment. If financial statements are prepared between the sale or purchase and the subsequent receipt or payment, and exchange rates have changed, there will be unrealized gains or losses. The Financial Accounting Standards Board,

in its *Statement No. 52*, requires that exchange gains and losses “shall be included in determining net income for the period in which the exchange rate changes.”² The requirement includes interim (quarterly) statements and applies whether or not a transaction is complete.

This ruling has caused much debate. Critics charge that it gives too much weight to fleeting changes in exchange rates, causing random changes in earnings that hide long-run trends. Others believe that the use of current exchange rates to value receivables and payables as of the balance sheet date is a major step toward economic reality (current values). To illustrate, we will use the preceding case, in which a U.S. company buys parts from a Japanese supplier. We will assume that the transaction has not been completed by the balance sheet date, when the exchange rate is \$.0080 per yen:

	Date	Exchange Rate (\$ per Yen)
Date of purchase	Dec. 1	.0090
Balance sheet date	Dec. 31	.0080
Date of payment	Feb. 1	.0085

The accounting effects of the unrealized gain are as follows:

		Dec. 1	Dec. 31	Feb. 1
Purchase recorded in U.S. dollars (billed as ¥2,500,000)		\$22,500	\$22,500	\$22,500
Dollars to be paid to equal ¥2,500,000 (¥2,500,000 × exchange rate)		22,500	20,000	21,250
Unrealized gain (or loss)		<u>—</u>	<u>\$ 2,500</u>	
Realized gain (or loss)				<u>\$ 1,250</u>
A = L + OE	Dec. 1	Purchases	22,500	
+ —		Accounts Payable, Japanese company		22,500
A = L + OE	Dec. 31	Accounts Payable, Japanese company	2,500	
— +		Exchange Gain or Loss		2,500
A = L + OE	Feb. 1	Accounts Payable, Japanese company	20,000	
— — —		Exchange Gain or Loss	1,250	
		Cash		21,250

In this case, the original sale was billed in yen by the Japanese company. Following the rules of *Statement No. 52*, an exchange gain of \$2,500 is recorded on December 31, and an exchange loss of \$1,250 is recorded on February 1. Even though these large fluctuations do not affect the net exchange gain of \$1,250 for the whole transaction, the effect on each year's income statements may be important.

Restatement of Foreign Subsidiary Financial Statements

Growing companies often expand by setting up or buying foreign subsidiaries. If a foreign subsidiary is more than 50 percent owned and the parent company exercises control, then the foreign subsidiary should be included in the consolidated financial statements (see the discussion of parent and subsidiary companies in Appendix B). The consolidation procedure is the same as that for domestic subsidiaries, except that the statements of the foreign subsidiary must be restated in the reporting currency before consolidation takes place. The *reporting currency* is the currency in which the consolidated financial statements are presented. Clearly, it makes no

sense to combine the assets of a Mexican subsidiary stated in pesos with the assets of the U.S. parent company stated in dollars. Most U.S. companies present their financial statements in U.S. dollars, so the following discussion assumes that the U.S. dollar is the reporting currency used.³

Restatement is the stating of one currency in terms of another. The method of restatement depends on the foreign subsidiary's functional currency. The *functional currency* is the currency of the place where the subsidiary carries on most of its business. Generally, it is the currency in which a company earns and spends its cash. The functional currency to be used depends on the kind of foreign operation in which the subsidiary takes part.

There are two broad types of foreign operation. Type I includes operations that are fairly self-contained and integrated within a certain country or economy. Type II includes those that are mainly a direct and integral part or extension of the parent company's operations. As a general rule, Type I subsidiaries use the currency of the country in which they are located, and Type II subsidiaries use the currency of the parent company. If the parent company is a U.S. company, the functional currency of a Type I subsidiary will be the currency of the country in which the subsidiary carries on its business, and the functional currency of a Type II subsidiary will be the U.S. dollar.

Statement No. 52 makes an exception when a Type I subsidiary operates in a country in which there is hyperinflation (as a rule of thumb, more than 100 percent cumulative inflation over three years)—for example, Brazil or Argentina. In such a case, the subsidiary is treated as a Type II subsidiary, with the functional currency being the U.S. dollar. Restatements in these situations do not affect cash flows because they are done simply for the convenience of preparing consolidated statements.

PROBLEMS

- P 1. Part A:** Cleveland Corporation purchased a special-purpose machine from Leipzig Corporation on credit for DM 50,000. At the date of purchase, the exchange rate was \$.55 per mark. On the date of the payment, which was made in marks, the value of the mark had increased to \$.60.

Prepare journal entries to record the purchase and payment in Cleveland Corporation's accounting records.

Part B: U.S. Corporation made a sale on account to U.K. Company on November 15 in the amount of £300,000. Payment was to be made in British pounds on February 15. U.S. Corporation's fiscal year is the same as the calendar year. The British pound was worth \$1.70 on November 15, \$1.58 on December 31, and \$1.78 on February 15.

Prepare journal entries to record the sale, year-end adjustment, and collection on U.S. Corporation's books.

- P 2.** High Valley Company, whose year end is June 30, engaged in the following international transactions (exchange rates in parentheses):

- May 15 Purchased goods from a Japanese firm for \$110,000; terms n/10 in U.S. dollars (yen = \$.0080).
- 17 Sold goods to a German company for \$165,000; terms n/30 in marks (mark = \$.55).
- 21 Purchased goods from a Mexican company for \$120,000; terms n/30 in pesos (peso = \$.10).
- 25 Paid for the goods purchased on May 15 (yen = \$.0085).
- 31 Sold goods to an Italian firm for \$200,000; terms n/60 in lire (lira = \$.0005).

- June 5 Sold goods to a British firm for \$56,000; terms n/10 in U.S. dollars (pound = \$1.30).
 7 Purchased goods from a Japanese firm for \$221,000; terms n/30 in yen (yen = \$.0085).
 15 Received payment for the sale made on June 5 (pound = \$1.80).
 16 Received payment for the sale made on May 17 (mark = \$.60).
 17 Purchased goods from a French firm for \$66,000; terms n/30 in U.S. dollars (franc = \$.16).
 20 Paid for the goods purchased on May 21 (peso = \$.09).
 22 Sold goods to a British firm for \$108,000; terms n/30 in pounds (pound = \$1.80).
 30 Made year-end adjusting entries for incomplete foreign exchange transactions (franc = \$.17; peso = \$.09; mark = \$.60; lira = \$.0003; pound = \$1.70; yen = \$.0090).
- July 7 Paid for the goods purchased on June 7 (yen = \$.0085).
 19 Paid for the goods purchased on June 17 (franc = \$.15).
 22 Received payment for the goods sold on June 22 (pound = \$1.60).
 30 Received payment for the goods sold on May 31 (lira = \$.0004).

REQUIRED

Prepare entries in journal form for these transactions.

ENDNOTES

1. At the time this chapter was written, exchange rates were fluctuating rapidly. Thus, the examples, exercises, and problems in this book use exchange rates in the general range for the countries involved.
2. *Statement of Financial Accounting Standards No. 52*, "Foreign Currency Translation" (Norwalk, Conn.: Financial Accounting Standards Board, 1981), par. 15.
3. This section is based on the requirements of *Statement of Financial Accounting Standards No. 52*, "Foreign Currency Translation" (Norwalk, Conn.: Financial Accounting Standards Board, 1981).

APPENDIX B

Long-Term Investments

One corporation may invest in another corporation by purchasing bonds or stocks. These investments may be either short term or long term. In this section, we are concerned with long-term investments.

Long-Term Investments in Bonds

Like all investments, investments in bonds are recorded at cost, which is the price of the bonds plus the broker's commission. When bonds are purchased between interest payment dates, the purchaser must also pay an amount equal to the interest that has accrued on the bonds since the last interest payment date. Then, on the next interest payment date, the purchaser receives an interest payment for the whole period. The payment for accrued interest should be recorded as a debit to Interest Income, which will be offset by a credit to Interest Income when the semiannual interest is received.

Subsequent accounting for a corporation's long-term bond investments depends on the classification of the bonds. If the company may at some point decide to sell the bonds, they are classified as *available-for-sale securities*. If the company plans to hold the bonds until they are paid off on their maturity date, they are considered *held-to-maturity securities*. Except in industries like insurance and banking, it is unusual for companies to buy the bonds of other companies with the express purpose of holding them until they mature, which can be in 10 to 30 years. Therefore, most firms classify long-term bond investments as available-for-sale securities. Such bonds are subsequently accounted for at fair value, much like equity or stock investments are. Fair value is usually the market value. When bonds are intended to be held to maturity, which is rare, they are accounted for not at fair value but at cost, adjusted for the amortization of their discount or premium. The procedure is similar to accounting for long-term bond liabilities, except that separate accounts for discounts and premiums are not used.

Long-Term Investments in Stock

All long-term investments in stocks are recorded at cost, in accordance with generally accepted accounting principles. The treatment of the investment in the accounting records after the initial purchase depends on the extent to which the investing company can exercise significant influence or control over the operating and financial policies of the other company.

The Accounting Principles Board defined the important terms *significant influence* and *control* in its *Opinion No. 18*. *Significant influence* is the ability to affect the operating and financial policies of the company whose shares are owned, even though the investor holds 50 percent or less of the voting stock. Ability to influence a company may be shown by representation on the board of directors, participation in policy making, material transactions between the companies, exchange of managerial personnel, and technological dependency. For the sake of uniformity, the APB decided that unless there is proof to the contrary, an investment of 20 percent or more of the voting stock should be presumed to confer significant influence. An investment of less than 20 percent of the voting stock would not confer significant influence.¹

Control is defined as the ability of the investing company to decide the operating and financial policies of the other company. Control is said to exist when the investing company owns more than 50 percent of the voting stock of the company in which it has invested.

Thus, in the absence of information to the contrary, a noninfluential and noncontrolling investment would be less than 20 percent ownership. An influential but noncontrolling investment would be 20 to 50 percent ownership. And a controlling investment would be more than 50 percent ownership. The accounting treatment differs for each kind of investment.

NONINFLUENTIAL AND NONCONTROLLING INVESTMENT Available-for-sale securities are debt or equity securities that are not classified as trading or held-to-maturity securities. When equity securities are involved, the further criterion is that they be noninfluential and noncontrolling investments of less than 20 percent of the voting stock. The Financial Accounting Standards Board requires a *cost adjusted to market method* for accounting for available-for-sale securities. Under this method, available-for-sale securities must be recorded initially at cost and thereafter adjusted periodically through the use of an allowance account to reflect changes in the market value.²

Available-for-sale securities are classified as long term if management intends to hold them for more than one year. When accounting for long-term available-for-sale securities, the unrealized gain or loss resulting from the adjustment is not reported on the income statement, but is reported as a special item in the stockholders' equity section of the balance sheet and in comprehensive income disclosure.

At the end of each accounting period, the total cost and the total market value of these long-term stock investments must be determined. If the total market value is less than the total cost, the difference must be credited to a contra-asset account called Allowance to Adjust Long-Term Investments to Market. Because of the long-term nature of the investment, the debit part of the entry, which represents a decrease in value below cost, is treated as a temporary decrease and does not appear as a loss on the income statement. It is shown in a contra-stockholders' equity account called Unrealized Loss on Long-Term Investments. Thus, both of these accounts are balance sheet accounts. If the market value exceeds the cost, the allowance account is added to Long-Term Investments and the unrealized gain appears as an addition to stockholders' equity.³

When long-term investments in stock are sold, the difference between the sale price and what the stock cost is recorded and reported as a realized gain or loss on

the income statement. Dividend income from such investments is recorded by a debit to Cash and a credit to Dividend Income.

For example, assume the following facts about the long-term stock investments of Coleman Corporation:

- June 1, 20x0 Paid cash for the following long-term investments: 10,000 shares of Durbin Corporation common stock (representing 2 percent of outstanding stock) at \$25 per share; 5,000 shares of Kotes Corporation common stock (representing 3 percent of outstanding stock) at \$15 per share.
- Dec. 31, 20x0 Quoted market prices at year end: Durbin common stock, \$21; Kotes common stock, \$17.
- Apr. 1, 20x1 Change in policy required sale of 2,000 shares of Durbin Corporation common stock at \$23.
- July 1, 20x1 Received cash dividend from Kotes Corporation equal to \$.20 per share.
- Dec. 31, 20x1 Quoted market prices at year end: Durbin common stock, \$24; Kotes common stock, \$13.

Entries to record these transactions follow.

Investment				
	20x0			
A = L + OE	June 1	Long-Term Investments	325,000	
+		Cash		325,000
—		Made investments in Durbin common stock (10,000 shares × \$25 = \$250,000) and Kotes common stock (5,000 shares × \$15 = \$75,000)		
Year-End Adjustment				
	20x0			
A = L + OE	Dec. 31	Unrealized Loss on Long-Term Investments	30,000	
—	—	Allowance to Adjust Long-Term Investments to Market		30,000
		Recorded reduction of long-term investment to market		
Company	Shares	Market Price	Total Market	Total Cost
Durbin	10,000	\$21	\$210,000	\$250,000
Kotes	5,000	17	85,000	75,000
			<u>\$295,000</u>	<u>\$325,000</u>

$$\text{Total Cost} - \text{Total Market Value} = \$325,000 - \$295,000 = \$30,000$$

Sale				
	20x1			
A = L + OE	Apr. 1	Cash	46,000	
+		Loss on Sale of Investments	4,000	
—		Long-Term Investments		50,000
		Sold 2,000 shares of Durbin common stock		
		2,000 × \$23 = \$46,000		
		2,000 × \$25 = 50,000		
		Loss	<u>\$ 4,000</u>	


Dividend Received				
A = L + OE + +	20x1			
	July 1	Cash	1,000	
		Dividend Income		1,000
		Received cash dividend from Kotes stock		
		5,000 × \$.20 = \$1,000		
Year-End Adjustment				
A = L + OE + +	20x1			
	Dec. 31	Allowance to Adjust Long-Term		
		Investments to Market	12,000	
		Unrealized Loss on Long-Term		
		Investments		12,000
		Recorded the adjustment in long-term investment so it is reported at market		

The adjustment equals the previous balance (\$30,000 from the December 31, 20x0, entry) minus the new balance (\$18,000), or \$12,000. The new balance of \$18,000 is the difference at the present time between the total market value and the total cost of all investments. It is figured as follows:

Company	Shares	Market Price	Total Market	Total Cost
Durbin	8,000	\$24	\$192,000	\$200,000
Kotes	5,000	13	65,000	75,000
			<u>\$257,000</u>	<u>\$275,000</u>

Total Cost – Total Market Value = \$275,000 – \$257,000 = \$18,000

The Allowance to Adjust Long-Term Investments to Market and the Unrealized Loss on Long-Term Investments are reciprocal contra accounts, each with the same dollar balance, as can be shown by the effects of these transactions on the T accounts:

CONTRA-ASSET ACCOUNT				CONTRA-STOCKHOLDERS' EQUITY ACCOUNT			
Allowance to Adjust Long-Term Investments to Market				Unrealized Loss on Long-Term Investments			
20x1	12,000	20x0	30,000	20x0	30,000	20x1	12,000
		Bal. 20x1	18,000	Bal. 20x1	18,000		
							

The Allowance account reduces long-term investments by the amount by which the cost of the investments exceeds market; the Unrealized Loss account reduces stockholders' equity by a similar amount. The opposite effects will exist if market value exceeds cost, resulting in an unrealized gain.

INFLUENTIAL BUT NONCONTROLLING INVESTMENT As we have seen, ownership of 20 percent or more of a company's voting stock is considered sufficient to influence the operations of that corporation. When this is the case, the investment in the stock of the influenced company should be accounted for using the *equity method*. The equity method presumes that an investment of 20 percent or more is more than a passive investment, and that therefore the investing company should

share proportionately in the success or failure of the investee company. The three main features of this method are as follows:

1. The investor records the original purchase of the stock at cost.
2. The investor records its share of the investee's periodic net income as an increase in the Investment account, with a corresponding credit to an income account. In like manner, the investor records its share of the investee's periodic loss as a decrease in the Investment account, with a corresponding debit to a loss account.
3. When the investor receives a cash dividend, the asset account Cash is increased and the Investment account is decreased.

To illustrate the equity method of accounting, we will assume the following facts about an investment by Vassor Corporation. On January 1 of the current year, Vassor acquired 40 percent of the voting common stock of Block Corporation for \$180,000. With this share of ownership, Vassor can exert significant influence over the operations of Block. During the year, Block Corporation reported net income of \$80,000 and paid cash dividends of \$20,000. The entries that follow are to record these transactions by Vassor Corporation.

Investment			
A = L + OE	Investment in Block Corporation	180,000	
+	Cash		180,000
—	Invested in Block Corporation common stock		
Recognition of Income			
A = L + OE	Investment in Block Corporation	32,000	
+	Income, Block Corporation Investment		32,000
+	Recognized 40% of income reported by Block Corporation		
	$40\% \times \$80,000 = \$32,000$		
Receipt of Cash Dividend			
A = L + OE	Cash	8,000	
+	Investment in Block Corporation		8,000
—	Cash dividend from Block Corporation		
	$40\% \times \$20,000 = \$8,000$		

The balance of the Investment in Block Corporation account after these transactions is \$204,000, as shown here:

Investment in Block Corporation			
Investment	180,000	Dividend received	8,000
Share of income	32,000		
Bal.	204,000		

CONTROLLING INVESTMENT In some cases, an investor who owns less than 50 percent of the voting stock of a company may exercise such powerful influence that for all practical purposes the investor controls the policies of the other company. Nevertheless, ownership of more than 50 percent of the voting stock is required for accounting recognition of control. When a controlling interest is owned, a parent-subsidiary relationship is said to exist. The investing company is known as the *parent company*, the other company as the *subsidiary*. Because the two corporations are separate legal entities, each prepares separate financial statements.

Table 1. Accounting Treatments of Long-Term Investments in Stock

Level of Ownership	Percentage of Ownership	Accounting Treatment
Noninfluential and noncontrolling	Less than 20%	Cost initially; investment adjusted subsequent to purchase for changes in market value
Influential but noncontrolling	Between 20% and 50%	Equity method; investment valued subsequently at cost plus investor's share of income (or minus investor's share of loss) minus dividends received
Controlling	More than 50%	Financial statements consolidated

However, owing to their special relationship, they are viewed for public financial reporting purposes as a single economic entity. For this reason, they must combine their financial statements into a single set of statements called *consolidated financial statements*.

Accounting for consolidated financial statements is very complex. It is usually the subject of an advanced accounting course. However, most large public corporations have subsidiaries and must prepare consolidated financial statements. It is therefore important to have some understanding of accounting for consolidations.

The proper accounting treatments for long-term investments in stock are summarized in Table 1.

PROBLEMS

P 1. Diversified Corporation has the following long-term investments:

- 60 percent of the common stock of Down Corporation
- 13 percent of the common stock of West Lake, Inc.
- 50 percent of the nonvoting preferred stock of Invole Corporation
- 100 percent of the common stock of its financing subsidiary, DCF, Inc.
- 35 percent of the common stock of the French company Maison de Boutaine
- 70 percent of the common stock of the Canadian company Alberta Mining Company

For each of these investments, tell which of the following methods should be used for external financial reporting, and why.

- Cost adjusted to market method
- Equity method
- Consolidation of parent and subsidiary financial statements

P 2. Red Bud Corporation made the following transactions in its Long-Term Investments account over a two-year period:

20x0

- Apr. 1 Purchased with cash 20,000 shares of Season Company stock for \$152 per share.

- June 1 Purchased with cash 15,000 shares of Abbado Corporation stock for \$72 per share.
- Sept. 1 Received a \$1 per share dividend from Season Company.
- Nov. 1 Purchased with cash 25,000 shares of Frankel Corporation stock for \$110 per share.
- Dec. 31 Market values per share of shares held in the Long-Term Investments account were as follows: Season Company, \$140; Abbado Corporation, \$32; and Frankel Corporation, \$122.

20x1

- Feb. 1 Because of unfavorable prospects for Abbado Corporation, Abbado stock was sold for cash at \$40 per share.
- May 1 Purchased with cash 10,000 shares of Schulian Corporation for \$224 per share.
- Sept. 1 Received \$2 per share dividend from Season Company.
- Dec. 31 Market values per share of shares held in the Long-Term Investments account were as follows: Season Company, \$160; Frankel Corporation, \$140; and Schulian Corporation, \$200.

REQUIRED

Prepare entries to record these transactions in the Red Bud Corporation records. Assume that all investments represent less than 20 percent of the voting stock of the company whose stock was acquired.

Long-Term Investments: Equity Method

- P 3.** The Modi Company owns 40 percent of the voting stock of the Vivanco Company. The Investment account for this company on the Modi Company's balance sheet had a balance of \$600,000 on January 1, 20xx. During 20xx, the Vivanco Company reported the following quarterly earnings and dividends paid:

Quarter	Earnings	Dividends Paid
1	\$ 80,000	\$ 40,000
2	60,000	40,000
3	160,000	40,000
4	(40,000)	40,000
	<u>\$260,000</u>	<u>\$160,000</u>

The Modi Company exercises a significant influence over the operations of the Vivanco Company and therefore uses the equity method to account for its investment.

REQUIRED

1. Prepare the entries in journal form that the Modi Company must make each quarter in accounting for its investment in the Vivanco Company.
2. Prepare a T account for the investment in common stock of the Vivanco Company. Enter the beginning balance, relevant portions of the entries made in 1, and the ending balance.

ENDNOTES

1. The Financial Accounting Standards Board points out in its *Interpretation No. 35* (May 1981) that although the presumption of significant influence applies when 20 percent or more of the voting stock is held, the rule is not a rigid one. All relevant facts and circumstances should be examined in each case to find out whether or not significant influence exists. For example, the FASB notes five circumstances that may remove the element of significant influence: (1) The company files a lawsuit against the investor or complains to a government agency; (2) the investor tries and fails to become a director; (3) the investor agrees not to increase its holdings; (4) the company is operated by a small group that ignores the investor's wishes; (5) the investor tries and fails to obtain additional information from the company that is not available to other stockholders.
2. *Statement of Financial Accounting Standards No. 115*, "Accounting for Certain Investments in Debt and Equity Securities" (Norwalk, Conn.: Financial Accounting Standards Board, 1993).
3. If the decrease in value is deemed permanent, a different procedure is followed to record the decline in market value of the long-term investment. A loss account that appears on the income statement is debited instead of the Unrealized Loss account.

APPENDIX C

The Time Value of Money

Simple Interest and Compound Interest

Interest is the cost associated with the use of money for a specific period of time. Because interest is a cost associated with time, and “time is money,” it is also an important consideration in any business decision. *Simple interest* is the interest cost for one or more periods, under the assumption that the amount on which the interest is computed stays the same from period to period. *Compound interest* is the interest cost for two or more periods, under the assumption that after each period the interest of that period is added to the amount on which interest is computed in future periods. In other words, compound interest is interest earned on a principal sum that is increased at the end of each period by the interest for that period.

EXAMPLE—SIMPLE INTEREST Joe Sanchez accepts an 8 percent, \$30,000 note due in ninety days. How much will he receive in total at that time? Remember that the formula for calculating simple interest is as follows:

$$\begin{aligned}\text{Interest} &= \text{Principal} \times \text{Rate} \times \text{Time} \\ &= \$30,000 \times 8/100 \times 90/360 \\ &= \$600\end{aligned}$$

Therefore, the total that Sanchez will receive is calculated as follows:

$$\begin{aligned}\text{Total} &= \text{Principal} + \text{Interest} \\ &= \$30,000 + \$600 \\ &= \$30,600\end{aligned}$$

EXAMPLE—COMPOUND INTEREST Ann Clary deposits \$5,000 in a savings account that pays 6 percent interest. She expects to leave the principal and accumulated interest in the account for three years. How much will her account total at the end of three years? Assume that the interest is paid at the end of the year and is added to the principal at that time, and that this

total in turn earns interest. The amount at the end of three years is computed as follows:

(1) Year	(2) Principal Amount at Beginning of Year	(3) Annual Amount of Interest (Col. 2 \times 6%)	(4) Accumulated Amount at End of Year (Col. 2 + Col. 3)
1	\$5,000.00	\$300.00	\$5,300.00
2	5,300.00	318.00	5,618.00
3	5,618.00	337.08	5,955.08

At the end of three years, Clary will have \$5,955.08 in her savings account. Note that the annual amount of interest increases each year by the interest rate times the interest of the previous year. For example, between year 1 and year 2, the interest increased by \$18 (\$318 – \$300), which exactly equals 6 percent times \$300.

Future Value of a Single Invested Sum at Compound Interest

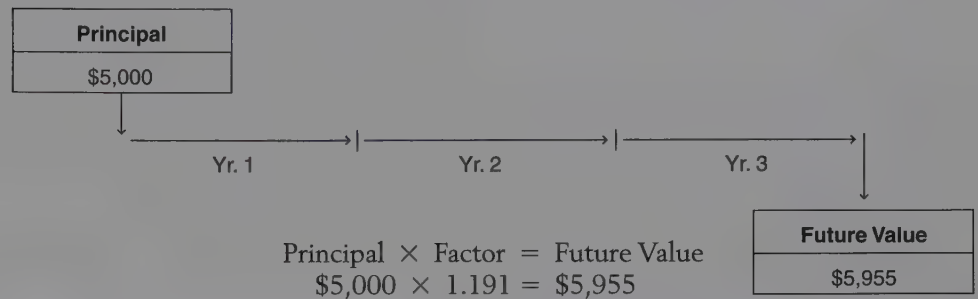
Another way to ask the question in the example of compound interest above is, What is the future value of a single sum (\$5,000) at compound interest (6 percent) for three years? *Future value* is the amount that an investment will be worth at a future date if invested at compound interest. A businessperson often wants to know future value, but the method of computing the future value illustrated above is too time-consuming in practice. Imagine how tedious the calculation would be if the example were ten years instead of three. Fortunately, there are tables that simplify solving problems involving compound interest. Table 1, showing the future value of \$1 after a given number of time periods, is an example. It is actually part of a larger table, Table 1 in the appendix on future value and present value tables. Suppose that we want to solve the problem of Clary's savings account above. We

Table 1. Future Value of \$1 after a Given Number of Time Periods

Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.120	1.140	1.150
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210	1.254	1.300	1.323
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.405	1.482	1.521
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.574	1.689	1.749
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.762	1.925	2.011
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.974	2.195	2.313
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.211	2.502	2.660
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.476	2.853	3.059
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.773	3.252	3.518
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	3.106	3.707	4.046

Source: Excerpt from Table 1 in the appendix on future value and present value tables.

simply look down the 6 percent column in Table 1 until we reach the line for three periods and find the factor 1.191. This factor, when multiplied by \$1, gives the future value of that \$1 at compound interest of 6 percent for three periods (years in this case). Thus, we solve the problem as follows:



Except for a rounding difference of \$.08, the answer is exactly the same as that calculated earlier.

Future Value of an Ordinary Annuity

Another common problem involves an *ordinary annuity*, which is a series of equal payments made at the end of equal intervals of time, with compound interest on these payments.

The following example shows how to find the future value of an ordinary annuity. Assume that Ben Katz makes a \$200 payment at the end of each of the next three years into a savings account that pays 5 percent interest. How much money will he have in his account at the end of the three years? One way of computing the amount is shown in the following table.

(1) Year	(2) Beginning Balance	(3) Interest Earned (5% × Col. 2)	(4) Periodic Payment	(5) Accumulated at End of Period (Col. 2 + Col. 3 + Col. 4)
1	—	—	\$200	\$200.00
2	\$200.00	\$10.00	200	410.00
3	410.00	20.50	200	630.50

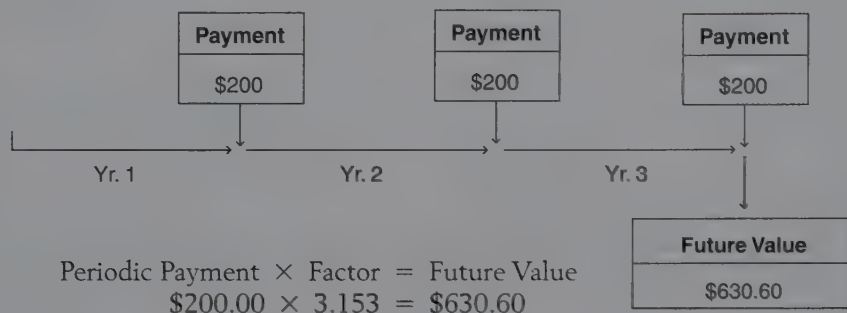
Katz would have \$630.50 in his account at the end of three years, consisting of \$600.00 in periodic payments and \$30.50 in interest.

This calculation can also be simplified by using Table 2. We look down the 5 percent column until we reach three periods and find the factor 3.153. This factor, when multiplied by \$1, gives the future value of a series of three \$1 payments at compound interest of 5 percent. Thus, we solve the problem as shown on the next page.

Table 2. Future Value of an Ordinary Annuity of \$1 Paid in Each Period for a Given Number of Time Periods

Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.120	2.140	2.150
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310	3.374	3.440	3.473
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.779	4.921	4.993
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.353	6.610	6.742
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	8.115	8.536	8.754
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	10.09	10.73	11.07
8	8.286	8.583	8.892	9.214	9.549	9.897	10.26	10.64	11.03	11.44	12.30	13.23	13.73
9	9.369	9.755	10.16	10.58	11.03	11.49	11.98	12.49	13.02	13.58	14.78	16.09	16.79
10	10.46	10.95	11.46	12.01	12.58	13.18	13.82	14.49	15.19	15.94	17.55	19.34	20.30

Source: Excerpt from Table 2 in the appendix on future value and present value tables.



Except for a rounding difference of \$.10, this result is the same as our earlier one.

Present Value

Suppose that you had the choice of receiving \$100 today or one year from today. Intuitively, you would choose to receive the \$100 today. Why? You know that if you have the \$100 today, you can put it in a savings account to earn interest, so that you will have more than \$100 a year from today. Therefore, we can say that an amount to be received in the future (future value) is not worth as much today as an amount to be received today (present value) because of the cost associated with the passage of time. In fact, present value and future value are closely related. *Present value* is the amount that must be invested now at a given rate of interest to produce a given future value. For example, assume that Sue Dapper needs \$1,000 one year from now. How much should she invest today to achieve that goal if the interest rate is 5 percent? From earlier examples, the following equation may be established.

$$\begin{aligned}
 \text{Present Value} \times (1.0 + \text{Interest Rate}) &= \text{Future Value} \\
 \text{Present Value} \times 1.05 &= \$1,000.00 \\
 \text{Present Value} &= \$1,000.00 \div 1.05 \\
 \text{Present Value} &= \$952.38
 \end{aligned}$$

Thus, to achieve a future value of \$1,000.00, a present value of \$952.38 must be invested. Interest of 5 percent on \$952.38 for one year equals \$47.62, and these two amounts added together equal \$1,000.00.

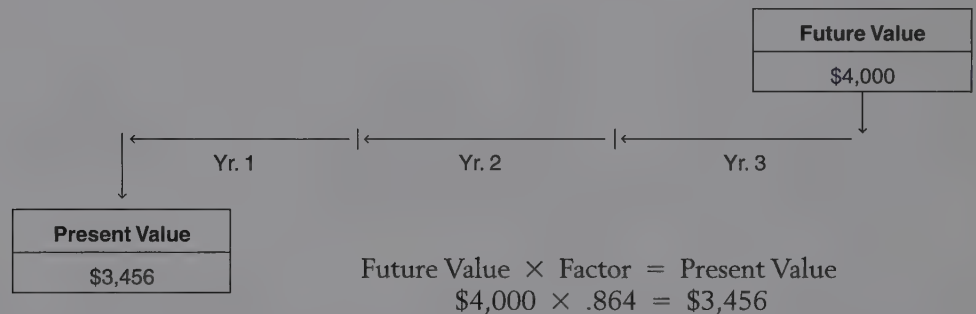
PRESENT VALUE OF A SINGLE SUM DUE IN THE FUTURE

When more than one time period is involved, the calculation of present value is more complicated. Consider the following example. Don Riley wants to be sure of having \$4,000 at the end of three years. How much must he invest today in a 5 percent savings account to achieve this goal? Adapting the above equation, we compute the present value of \$4,000 at compound interest of 5 percent for three years in the future.

Year	Amount at End of Year	Divide by			Present Value at Beginning of Year
3	\$4,000.00	÷	1.05	=	\$3,809.52
2	3,809.52	÷	1.05	=	3,628.11
1	3,628.11	÷	1.05	=	3,455.34

Riley must invest a present value of \$3,455.34 to achieve a future value of \$4,000.00 in three years.

This calculation is again made much easier by using the appropriate table. In Table 3, we look down the 5 percent column until we reach three periods and find the factor .864. This factor, when multiplied by \$1, gives the present value of \$1 to be received three years from now at 5 percent interest. Thus, we solve the problem as shown below.



Except for a rounding difference of \$.66, this result is the same as the one above.

Table 3. Present Value of \$1 to Be Received at the End of a Given Number of Time Periods

Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386

Source: Excerpt from Table 3 in the appendix on future value and present value tables.

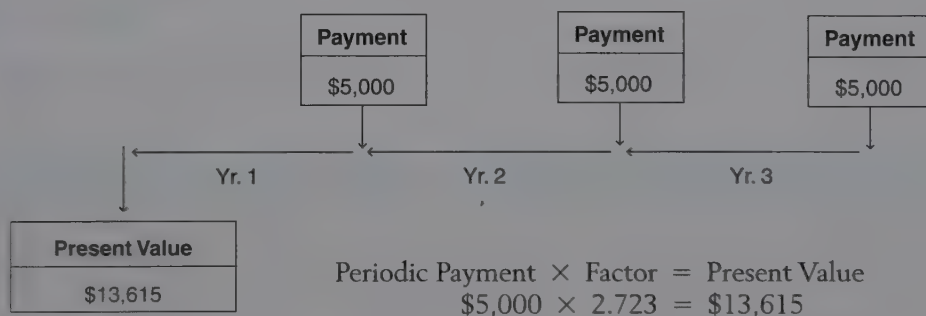
PRESENT VALUE OF AN ORDINARY ANNUITY It is often necessary to compute the present value of a series of receipts or payments. When we calculate the present value of equal amounts equally spaced over a period of time, we are computing the present value of an ordinary annuity.

For example, assume that Kathy Foster has sold a piece of property and is to receive \$15,000 in three equal annual payments of \$5,000, beginning one year from today. What is the present value of this sale, assuming a current interest rate of 5 percent? This present value may be computed by calculating a separate present value for each of the three payments (using Table 3) and summing the results, as shown in the table below.

Future Receipts (Annuity)			Present Value Factor at 5 Percent (from Table 3)		Present Value
Year 1	Year 2	Year 3			
\$5,000			×	.952	= \$ 4,760
	\$5,000		×	.907	= 4,535
		\$5,000	×	.864	= 4,320
Total Present Value					<u>\$13,615</u>

The present value of this sale is \$13,615. Thus, there is an implied interest cost (given the 5 percent rate) of \$1,385 associated with the payment plan that allows the purchaser to pay in three installments.

We can make this calculation more easily by using Table 4. We look down the 5 percent column until we reach three periods and find the factor 2.723. This factor, when multiplied by \$1, gives the present value of a series of three \$1 payments (spaced one year apart) at compound interest of 5 percent. Thus, we solve the problem as shown below.



This result is the same as the one computed earlier.

Time Periods

In all of the previous examples, and in most other cases, the compounding period is one year, and the interest rate is stated on an annual basis. However, in each of the four tables, the left-hand column refers not to years but to periods. This wording is intended to accommodate compounding periods of less than one year. Savings accounts that record interest quarterly and bonds that pay interest semiannually are cases in which the compounding period is less than one year. To use the tables

Table 4. Present Value of an Ordinary Annuity of \$1 Received Each Period for a Given Number of Time Periods

Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145

Source: Excerpt from Table 4 in the appendix on future value and present value tables.

in such cases, it is necessary to (1) divide the annual interest rate by the number of periods in the year, and (2) multiply the number of periods in one year by the number of years.

For example, assume that a \$6,000 note is to be paid in two years and carries an annual interest rate of 8 percent. Compute the maturity (future) value of the note, assuming that the compounding period is semiannual. Before using the table, it is necessary to compute the interest rate that applies to each compounding period and the total number of compounding periods. First, the interest rate to use is 4 percent (8% annual rate \div 2 periods per year). Second, the total number of compounding periods is 4 (2 periods per year \times 2 years). From Table 1, therefore, the maturity value of the note is computed as follows:

$$\begin{aligned}\text{Principal} \times \text{Factor} &= \text{Future Value} \\ \$6,000 \times 1.170 &= \$7,020\end{aligned}$$

The note will be worth \$7,020 in two years.

This procedure for determining the interest rate and the number of periods when the compounding period is less than one year may be used with all four tables.

Applications of Present Value to Accounting

The concept of present value is widely applicable in the discipline of accounting. Here, the purpose is to demonstrate its usefulness in some simple applications. In-depth study of present value is deferred to more advanced courses.

IMPUTING INTEREST ON NON-INTEREST-BEARING NOTES

Clearly there is no such thing as an interest-free debt, regardless of whether the interest rate is explicitly stated. The Accounting Principles Board has declared that when a long-term note does not explicitly state an interest rate (or if the interest rate is unreasonably low), a rate based on the normal interest cost of the company in question should be assigned, or imputed.¹

The following example applies this principle. On January 1, 20x0, Gato purchased merchandise from Haines by issuing an \$8,000 non-interest-bearing note due in two years. Gato can borrow money from the bank at 9 percent interest. Gato paid the note in full after two years.

Note that the \$8,000 note represents partly a payment for merchandise and partly a payment of interest for two years. In recording the purchase and sale, it is

necessary to use Table 3 to determine the present value of the note. The calculation follows.

$$\begin{array}{rclclcl} \text{Future Payment} & \times & \text{Present Value Factor (9\%, 2 years)} & = & \text{Present Value} \\ \$8,000 & \times & .842 & = & \$6,736 \end{array}$$

The imputed interest cost is \$1,264 (\$8,000 – \$6,736) and is recorded as a discount on notes payable in Gato's records and as a discount on notes receivable in Haines's records.

The entries necessary to record the purchase in the Gato records and the sale in the Haines records are as follows:

Gato Journal				Haines Journal			
A = L + OE							A = L + OE
–	–						+
+							–
	Purchases	6,736		Notes Receivable	8,000		
	Discount on			Discount on			
	Notes Payable	1,264		Notes Receivable	1,264		
	Notes Payable		8,000	Sales	6,736		

On December 31, 20x0, the adjustments to recognize the interest expense and interest income are as follows:

Gato Journal				Haines Journal			
A = L + OE							A = L + OE
–	–						+
+							–
	Interest Expense	606.24		Discount on			
	Discount on			Notes Receivable	606.24		
	Notes Payable		606.24	Interest Income		606.24	

The interest is calculated by multiplying the amount of the original purchase by the interest rate for one year (\$6,736.00 × .09 = \$606.24). When payment is made on December 31, 20x0, the following entries are made in the respective journals.

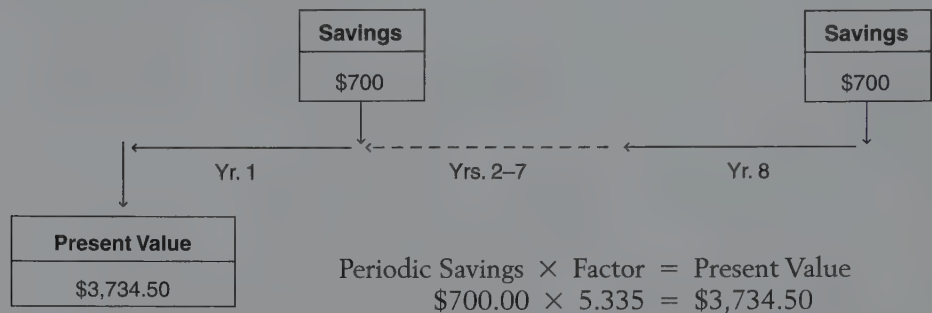
Gato Journal				Haines Journal			
A = L + OE							A = L + OE
–	+	–					+
–							+
	Interest Expense	657.76		Discount on			
	Notes Payable	8,000.00		Notes Receivable	657.76		
	Discount on			Cash	8,000.00		
	Notes Payable	657.76		Interest Income		657.76	
	Cash		8,000.00	Notes Receivable		8,000.00	

The interest entries represent the remaining interest to be expensed or realized (\$1,264 – \$606.24 = \$657.76). This amount approximates (because of rounding differences in the table) the interest for one year on the purchase plus last year's interest [(\$6,736 + \$606.24) × .09 = \$660.80].

VALUING AN ASSET An asset is recorded because it will provide future benefits to the company that owns it. These future benefits are the basis for the definition of an asset. Usually, the purchase price of the asset represents the present value of these future benefits. It is possible to evaluate a proposed purchase price for an asset by comparing that price with the present value of the asset to the company.

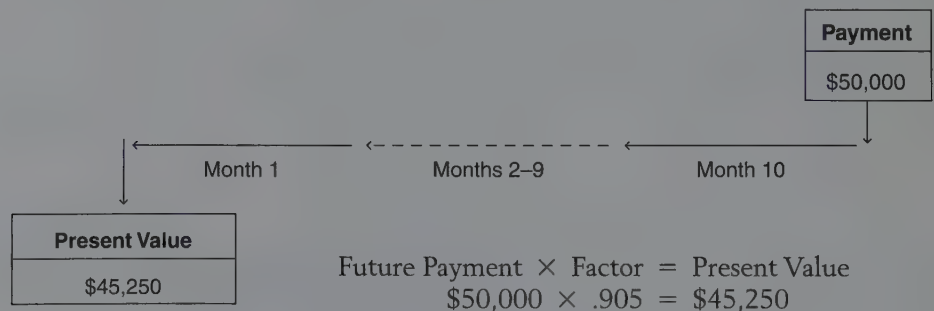
For example, Sam Hurst is thinking of buying a new machine that will reduce his annual labor cost by \$700 per year. The machine will last eight years. The interest rate that Hurst assumes for making managerial decisions is 10 percent. What is the maximum amount (present value) that Hurst should pay for the machine?

The present value of the machine to Hurst is equal to the present value of an ordinary annuity of \$700 per year for eight years at compound interest of 10 percent. Using the factor from Table 4, we compute the value as follows:



Hurst should not pay more than \$3,734.50 for the new machine because this amount equals the present value of the benefits that will be received from owning the machine.

DEFERRED PAYMENT A seller will sometimes agree to defer payment for a sale in order to encourage the buyer to make the purchase. This practice is common, for example, in the farm implement industry, where the farmer needs the equipment in the spring but cannot pay for it until the fall crop is in. Assume that Plains Implement Corporation sells a tractor to Dana Washington for \$50,000 on February 1, agreeing to take payment ten months later, on December 1. When this type of agreement is made, the future payment includes not only the sales price of the tractor but also an implied (imputed) interest cost. If the prevailing annual interest rate for such transactions is 12 percent compounded monthly, the actual sale (purchase) price of the tractor would be the present value of the future payment, computed using the factor from Table 3 (10 periods, 1 percent), as follows:



The purchase in Washington's records and the sale in Plains's records are recorded at the present value, \$45,250. The balance consists of interest expense or interest income. The entries necessary to record the purchase in Washington's records and the sale in Plains's records are as follows:

Washington Journal

A = L + OE	Feb. 1	Tractor	45,250	
+ +		Accounts Payable		45,250
		Purchased tractor		

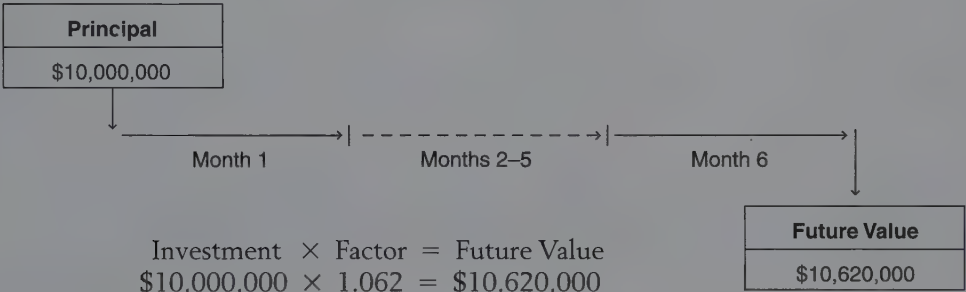
Plains Journal

		Accounts Receivable	45,250		A = L + OE
		Sales		45,250	+ +
		Sold tractor			

When Washington pays for the tractor, the entries are as follows:

Washington Journal				Plains Journal			
A = L + OE	Dec. 1	Accounts Payable	45,250	Cash	50,000	A = L + OE	
- - -		Interest Expense	4,750	Accounts Receivable	45,250	- - -	
		Cash	50,000	Interest Income	4,750	+	
		Paid on account, including imputed interest expense		Received on account from Washington, including imputed interest earned			

INVESTMENT OF IDLE CASH Childware Corporation, a toy manufacturer, has just completed a successful fall selling season and has \$10,000,000 in cash to invest for six months. The company places the cash in a money market account that is expected to pay 12 percent annual interest. Interest is compounded monthly and credited to the company's account each month. How much cash will the company have at the end of six months, and what entries will be made to record the investment and the monthly interest? The future value factor from Table 1 is based on six monthly periods of 1 percent (12 percent divided by 12 months), and the future value is computed as follows:



When the investment is made, the following entry is made:

A = L + OE	Short-Term Investments	10,000,000	
+	Cash		10,000,000
-	Made investment of cash		

After the first month, the interest is recorded by increasing the Short-Term Investments account.

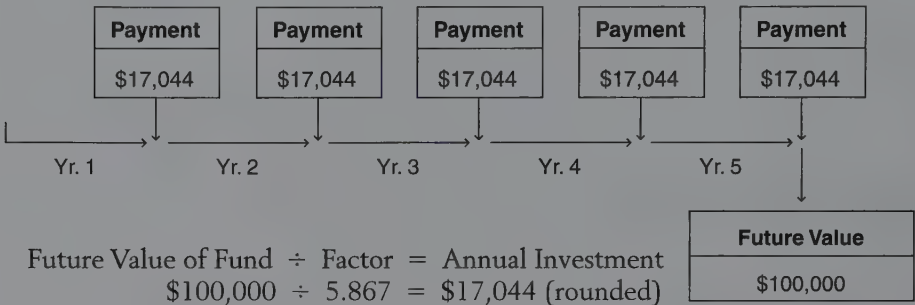
A = L + OE	Short-Term Investments	100,000	
+	Interest Income		100,000
+	Earned one month's interest income		
	\$10,000,000 × .01 = \$100,000		

After the second month, the interest is earned on the new balance of the Short-Term Investments account.

A = L + OE	Short-Term Investments	101,000	
+	Interest Income		101,000
+	Earned one month's interest income		
	\$10,100,000 × .01 = \$101,000		

Entries would continue in a similar manner for four more months, at which time the balance of Short-Term Investments would be about \$10,620,000. The actual amount accumulated may vary from this total because the interest rate paid on money market accounts can vary over time as a result of changes in market conditions.

ACCUMULATION OF A FUND When a company owes a large fixed amount due in several years, management would be wise to accumulate a fund with which to pay off the debt at maturity. Sometimes creditors, when they agree to provide a loan, require that such a fund be established. In establishing the fund, management must determine how much cash to set aside each period in order to pay the debt. The amount will depend on the estimated rate of interest the investments will earn. Assume that Vason Corporation agrees with a creditor to set aside cash at the end of each year to accumulate enough to pay off a \$100,000 note due in five years. Since the first contribution to the fund will be made in one year, five annual contributions will be made by the time the note is due. Assume also that the fund is projected to earn 8 percent, compounded annually. The amount of each annual payment is calculated using Table 2 (5 periods, 8 percent), as follows:



Each year's contribution to the fund is \$17,044, which is recorded as follows:

A = L + OE	Loan Repayment Fund	17,044	
+	Cash		17,044
–	Recorded annual contribution to loan repayment fund		

OTHER ACCOUNTING APPLICATIONS There are many other applications of present value in accounting, including accounting for installment notes, valuing a bond, and recording lease obligations. Present value is also applied in such areas as pension obligations; premium and discount on debt; depreciation of property, plant, and equipment; capital expenditure decisions; and generally any problem in which time is a factor.

EXERCISES

Tables 1 to 4 in the appendix on future value and present value tables may be used where appropriate to solve these exercises.

- E 1.** Wieland receives a one-year note for \$3,000 that carries a 12 percent annual interest rate for the sale of a used car.
Compute the maturity value under each of the following assumptions: (1) The interest is simple interest. (2) The interest is compounded semiannually. (3) The interest is compounded quarterly. (4) The interest is compounded monthly.
- E 2.** Find the future value of (1) a single payment of \$20,000 at 7 percent for ten years, (2) ten annual payments of \$2,000 at 7 percent, (3) a single payment of \$6,000 at 9 percent for seven years, and (4) seven annual payments of \$6,000 at 9 percent.
- E 3.** Assume that \$40,000 is invested today. Compute the amount that would accumulate at the end of seven years when the interest rate is (1) 8 percent compounded annually, (2) 8 percent compounded semiannually, and (3) 8 percent compounded quarterly.

Future Value Calculations

Future Value Calculations

Future Value Calculations

Future Value Calculations

- E 4.** Calculate the accumulation of periodic payments of \$1,000 made at the end of each of four years, assuming (1) 10 percent annual interest compounded annually, (2) 10 percent annual interest compounded semiannually, (3) 4 percent annual interest compounded annually, and (4) 16 percent annual interest compounded quarterly.

Future Value Applications

- E 5.** a. Two parents have \$20,000 to invest for their child's college tuition, which they estimate will cost \$40,000 when the child enters college twelve years from now. Calculate the approximate rate of annual interest that the investment must earn to reach the \$40,000 goal in twelve years. (**Hint:** Make a calculation; then use Table 1 in the appendix on future value and present value tables.)
 b. Ted Pruitt is saving to purchase a summer home that will cost about \$64,000. He has \$40,000 now, on which he can earn 7 percent annual interest. Calculate the approximate length of time he will have to wait to purchase the summer home. (**Hint:** Make a calculation; then use Table 1 in the appendix on future value and present value tables.)

Working Backward from a Future Value

- E 6.** Gloria Faraquez has a debt of \$90,000 due in four years. She wants to save enough money to pay it off by making annual deposits in an investment account that earns 8 percent annual interest. Calculate the amount she must deposit each year to reach her goal. (**Hint:** Use Table 2 in the appendix on future value and present value tables; then make a calculation.)

Determining an Advance Payment

- E 7.** Ellen Saber is contemplating paying five years' rent in advance. Her annual rent is \$9,600. Calculate the single sum that would have to be paid now for the advance rent, if we assume compound interest of 8 percent.

Present Value Calculations

- E 8.** Find the present value of (1) a single payment of \$24,000 at 6 percent for twelve years, (2) twelve annual payments of \$2,000 at 6 percent, (3) a single payment of \$5,000 at 9 percent for five years, and (4) five annual payments of \$5,000 at 9 percent.

Present Value of a Lump-Sum Contract

- E 9.** A contract calls for a lump-sum payment of \$60,000. Find the present value of the contract, assuming that (1) the payment is due in five years, and the current interest rate is 9 percent; (2) the payment is due in ten years, and the current interest rate is 9 percent; (3) the payment is due in five years, and the current interest rate is 5 percent; and (4) the payment is due in ten years, and the current interest rate is 5 percent.

Present Value of an Annuity Contract

- E 10.** A contract calls for annual payments of \$1,200. Find the present value of the contract, assuming that (1) the number of payments is seven, and the current interest rate is 6 percent; (2) the number of payments is fourteen, and the current interest rate is 6 percent; (3) the number of payments is seven, and the current interest rate is 8 percent; and (4) the number of payments is fourteen, and the current interest rate is 8 percent.

Non-Interest-Bearing Note

- E 11.** On January 1, 20x0, Pendleton purchased a machine from Leyland by signing a two-year, non-interest-bearing \$32,000 note. Pendleton currently pays 12 percent interest to borrow money at the bank. Prepare entries in Pendleton's and Leyland's journals to (1) record the purchase and the note, (2) adjust the accounts after one year, and (3) record payment of the note after two years (on December 31, 20x2).

Valuing an Asset for the Purpose of Making a Purchasing Decision

- E 12.** Oscar owns a service station and has the opportunity to purchase a car wash machine for \$30,000. After carefully studying projected costs and revenues, Oscar estimates that the car wash machine will produce a net cash flow of \$5,200 annually and will last for eight years. Oscar believes that an interest rate of 14 percent is adequate for his business. Calculate the present value of the machine to Oscar. Does the purchase appear to be a correct business decision?

Deferred Payment

- E 13.** Johnson Equipment Corporation sold a precision tool machine with computer controls to Borst Corporation for \$800,000 on January 1, agreeing to take payment nine months later, on October 1. Assuming that the prevailing annual interest rate for such a transaction is 16 percent compounded quarterly, what is the actual sale (purchase) price of the machine tool, and what journal entries will be made at the time of the purchase (sale) and at the time of the payment (receipt) on the records of both Borst and Johnson?

Investment of Idle Cash

- E 14.** Scientific Publishing Company, a publisher of college books, has just completed a successful fall selling season and has \$5,000,000 in cash to invest for nine months, beginning on January 1. The company placed the cash in a money market account that is expected to pay 12 percent annual interest compounded monthly. Interest is credited to the company's account each month. How much cash will the company have at the end of nine months, and what entries are made to record the investment and the first two monthly (February 1 and March 1) interest amounts?

Accumulation of a Fund

- E 15.** Laferia Corporation borrowed \$3,000,000 from an insurance company on a five-year note. Management agreed to set aside enough cash at the end of each year to accumulate the amount needed to pay off the note at maturity. Since the first contribution to the fund will be made in one year, four annual contributions are needed. Assuming that the fund will earn 10 percent compounded annually, how much will the annual contribution to the fund be (round to nearest dollar), and what will be the journal entry for the first contribution?

Negotiating the Sale of a Business

- E 16.** Horace Raftson is attempting to sell his business to Ernando Ruiz. The company has assets of \$900,000, liabilities of \$800,000, and owner's equity of \$100,000. Both parties agree that the proper rate of return to expect is 12 percent; however, they differ on other assumptions. Raftson believes that the business will generate at least \$100,000 per year of cash flows for twenty years. Ruiz thinks that \$80,000 in cash flows per year is more reasonable and that only ten years in the future should be considered. Using Table 4 in the appendix on future value and present value tables, determine the range for negotiation by computing the present value of Raftson's offer to sell and of Ruiz's offer to buy.

ENDNOTE

1. Accounting Principles Board, *Opinion No. 21*, "Interest on Receivables and Payables" (New York: American Institute of Certified Public Accountants, 1971), par. 13.

APPENDIX D

Future Value and Present Value Tables

Table 1 provides the multipliers necessary to compute the future value of a *single* cash deposit made at the *beginning* of year 1. Three factors must be known before the future value can be computed: (1) the time period in years, (2) the stated annual rate of interest to be earned, and (3) the dollar amount invested or deposited.

EXAMPLE—TABLE 1 Determine the future value of \$5,000 deposited now that will earn 9 percent interest compounded annually for five years. From Table 1, the necessary multiplier for five years at 9 percent is 1.539, and the answer is

$$\$5,000 \times 1.539 = \$7,695$$

Where r is the interest rate and n is the number of periods, the factor values for Table 1 are

$$\text{FV Factor} = (1 + r)^n$$

Situations requiring the use of Table 2 are similar to those requiring Table 1 except that Table 2 is used to compute the future value of a *series* of *equal* annual deposits at the end of each period.

Table 1. Future Value of \$1 After a Given Number of Time Periods

Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.120	1.140	1.150
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210	1.254	1.300	1.323
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.405	1.482	1.521
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.574	1.689	1.749
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.762	1.925	2.011
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.974	2.195	2.313
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.211	2.502	2.660
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.476	2.853	3.059
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.773	3.252	3.518
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	3.106	3.707	4.046
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.479	4.226	4.652
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.896	4.818	5.350
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	4.363	5.492	6.153
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.798	4.887	6.261	7.076
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	5.474	7.138	8.137
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	6.130	8.137	9.358
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054	6.866	9.276	10.760
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	7.690	10.580	12.380
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116	8.613	12.060	14.230
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.728	9.646	13.740	16.370
21	1.232	1.516	1.860	2.279	2.786	3.400	4.141	5.034	6.109	7.400	10.800	15.670	18.820
22	1.245	1.546	1.916	2.370	2.925	3.604	4.430	5.437	6.659	8.140	12.100	17.860	21.640
23	1.257	1.577	1.974	2.465	3.072	3.820	4.741	5.871	7.258	8.954	13.550	20.360	24.890
24	1.270	1.608	2.033	2.563	3.225	4.049	5.072	6.341	7.911	9.850	15.180	23.210	28.630
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.830	17.000	26.460	32.920
26	1.295	1.673	2.157	2.772	3.556	4.549	5.807	7.396	9.399	11.920	19.040	30.170	37.860
27	1.308	1.707	2.221	2.883	3.733	4.822	6.214	7.988	10.250	13.110	21.320	34.390	43.540
28	1.321	1.741	2.288	2.999	3.920	5.112	6.649	8.627	11.170	14.420	23.880	39.200	50.070
29	1.335	1.776	2.357	3.119	4.116	5.418	7.114	9.317	12.170	15.860	26.750	44.690	57.580
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.060	13.270	17.450	29.960	50.950	66.210
40	1.489	2.208	3.262	4.801	7.040	10.290	14.970	21.720	31.410	45.260	93.050	188.900	267.900
50	1.645	2.692	4.384	7.107	11.470	18.420	29.460	46.900	74.360	117.400	289.000	700.200	1,084.000

Table 2. Future Value of \$1 Paid in Each Period for a Given Number of Time Periods

Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.120	2.140	2.150
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310	3.374	3.440	3.473
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.779	4.921	4.993
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.353	6.610	6.742
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	8.115	8.536	8.754
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	10.090	10.730	11.070
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.640	11.030	11.440	12.300	13.230	13.730
9	9.369	9.755	10.160	10.580	11.030	11.490	11.980	12.490	13.020	13.580	14.780	16.090	16.790
10	10.460	10.950	11.460	12.010	12.580	13.180	13.820	14.490	15.190	15.940	17.550	19.340	20.300
11	11.570	12.170	12.810	13.490	14.210	14.970	15.780	16.650	17.560	18.530	20.650	23.040	24.350
12	12.680	13.410	14.190	15.030	15.920	16.870	17.890	18.980	20.140	21.380	24.130	27.270	29.000
13	13.810	14.680	15.620	16.630	17.710	18.880	20.140	21.500	22.950	24.520	28.030	32.090	34.350
14	14.950	15.970	17.090	18.290	19.600	21.020	22.550	24.210	26.020	27.980	32.390	37.580	40.500
15	16.100	17.290	18.600	20.020	21.580	23.280	25.130	27.150	29.360	31.770	37.280	43.840	47.580
16	17.260	18.640	20.160	21.820	23.660	25.670	27.890	30.320	33.000	35.950	42.750	50.980	55.720
17	18.430	20.010	21.760	23.700	25.840	28.210	30.840	33.750	36.970	40.540	48.880	59.120	65.080
18	19.610	21.410	23.410	25.650	28.130	30.910	34.000	37.450	41.300	45.600	55.750	68.390	75.840
19	20.810	22.840	25.120	27.670	30.540	33.760	37.380	41.450	46.020	51.160	63.440	78.970	88.210
20	22.020	24.300	26.870	29.780	33.070	36.790	41.000	45.760	51.160	57.280	72.050	91.020	102.400
21	23.240	25.780	28.680	31.970	35.720	39.990	44.870	50.420	56.760	64.000	81.700	104.800	118.800
22	24.470	27.300	30.540	34.250	38.510	43.390	49.010	55.460	62.870	71.400	92.500	120.400	137.600
23	25.720	28.850	32.450	36.620	41.430	47.000	53.440	60.890	69.530	79.540	104.600	138.300	159.300
24	26.970	30.420	34.430	39.080	44.500	50.820	58.180	66.760	76.790	88.500	118.200	158.700	184.200
25	28.240	32.030	36.460	41.650	47.730	54.860	63.250	73.110	84.700	98.350	133.300	181.900	212.800
26	29.530	33.670	38.550	44.310	51.110	59.160	68.680	79.950	93.320	109.200	150.300	208.300	245.700
27	30.820	35.340	40.710	47.080	54.670	63.710	74.480	87.350	102.700	121.100	169.400	238.500	283.600
28	32.130	37.050	42.930	49.970	58.400	68.530	80.700	95.340	113.000	134.200	190.700	272.900	327.100
29	33.450	38.790	45.220	52.970	62.320	73.640	87.350	104.000	124.100	148.600	214.600	312.100	377.200
30	34.780	40.570	47.580	56.080	66.440	79.060	94.460	113.300	136.300	164.500	241.300	356.800	434.700
40	48.890	60.400	75.400	95.030	120.800	154.800	199.600	259.100	337.900	442.600	767.100	1,342.000	1,779.000
50	64.460	84.580	112.800	152.700	209.300	290.300	406.500	573.800	815.100	1,164.000	2,400.000	4,995.000	7,218.000

EXAMPLE—TABLE 2

What will be the future value at the end of 30 years if \$1,000 is deposited each year on January 1, beginning in one year, assuming 12 percent interest compounded annually? The required multiplier from Table 2 is 241.3, and the answer is

$$\$1,000 \times 241.3 = \$241,300$$

The factor values for Table 2 are

$$\text{FVa Factor} = \frac{(1 + r)^n - 1}{r}$$

Table 3. Present Value of \$1 to Be Received at the End of a Given Number of Time Periods

Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.893
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.797
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.712
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.636
5	0.951	0.906	0.883	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.567
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.507
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.452
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.404
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.361
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.322
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.287
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.257
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.229
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.205
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.183
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.163
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.146
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.130
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.116
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.104
21	0.811	0.660	0.538	0.439	0.359	0.294	0.242	0.199	0.164	0.135	0.093
22	0.803	0.647	0.522	0.422	0.342	0.278	0.226	0.184	0.150	0.123	0.083
23	0.795	0.634	0.507	0.406	0.326	0.262	0.211	0.170	0.138	0.112	0.074
24	0.788	0.622	0.492	0.390	0.310	0.247	0.197	0.158	0.126	0.102	0.066
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.059
26	0.772	0.598	0.464	0.361	0.281	0.220	0.172	0.135	0.106	0.084	0.053
27	0.764	0.586	0.450	0.347	0.268	0.207	0.161	0.125	0.098	0.076	0.047
28	0.757	0.574	0.437	0.333	0.255	0.196	0.150	0.116	0.090	0.069	0.042
29	0.749	0.563	0.424	0.321	0.243	0.185	0.141	0.107	0.082	0.063	0.037
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.033
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.011
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009	0.003

Table 3 is used to compute the value today of a single amount of cash to be received sometime in the future. To use Table 3, you must first know: (1) the time period in years until funds will be received, (2) the stated annual rate of interest, and (3) the dollar amount to be received at the end of the time period.

EXAMPLE—TABLE 3 What is the present value of \$30,000 to be received 25 years from now, assuming a 14 percent interest rate? From Table 3, the required multiplier is .038, and the answer is

$$\$30,000 \times .038 = \$1,140$$

14%	15%	16%	18%	20%	25%	30%	35%	40%	45%	50%	Periods
0.877	0.870	0.862	0.847	0.833	0.800	0.769	0.741	0.714	0.690	0.667	1
0.769	0.756	0.743	0.718	0.694	0.640	0.592	0.549	0.510	0.476	0.444	2
0.675	0.658	0.641	0.609	0.579	0.512	0.455	0.406	0.364	0.328	0.296	3
0.592	0.572	0.552	0.516	0.482	0.410	0.350	0.301	0.260	0.226	0.198	4
0.519	0.497	0.476	0.437	0.402	0.328	0.269	0.223	0.186	0.156	0.132	5
0.456	0.432	0.410	0.370	0.335	0.262	0.207	0.165	0.133	0.108	0.088	6
0.400	0.376	0.354	0.314	0.279	0.210	0.159	0.122	0.095	0.074	0.059	7
0.351	0.327	0.305	0.266	0.233	0.168	0.123	0.091	0.068	0.051	0.039	8
0.308	0.284	0.263	0.225	0.194	0.134	0.094	0.067	0.048	0.035	0.026	9
0.270	0.247	0.227	0.191	0.162	0.107	0.073	0.050	0.035	0.024	0.017	10
0.237	0.215	0.195	0.162	0.135	0.086	0.056	0.037	0.025	0.017	0.012	11
0.208	0.187	0.168	0.137	0.112	0.069	0.043	0.027	0.018	0.012	0.008	12
0.182	0.163	0.145	0.116	0.093	0.055	0.033	0.020	0.013	0.008	0.005	13
0.160	0.141	0.125	0.099	0.078	0.044	0.025	0.015	0.009	0.006	0.003	14
0.140	0.123	0.108	0.084	0.065	0.035	0.020	0.011	0.006	0.004	0.002	15
0.123	0.107	0.093	0.071	0.054	0.028	0.015	0.008	0.005	0.003	0.002	16
0.108	0.093	0.080	0.060	0.045	0.023	0.012	0.006	0.003	0.002	0.001	17
0.095	0.081	0.069	0.051	0.038	0.018	0.009	0.005	0.002	0.001	0.001	18
0.083	0.070	0.060	0.043	0.031	0.014	0.007	0.003	0.002	0.001		19
0.073	0.061	0.051	0.037	0.026	0.012	0.005	0.002	0.001	0.001		20
0.064	0.053	0.044	0.031	0.022	0.009	0.004	0.002	0.001			21
0.056	0.046	0.038	0.026	0.018	0.007	0.003	0.001	0.001			22
0.049	0.040	0.033	0.022	0.015	0.006	0.002	0.001				23
0.043	0.035	0.028	0.019	0.013	0.005	0.002	0.001				24
0.038	0.030	0.024	0.016	0.010	0.004	0.001	0.001				25
0.033	0.026	0.021	0.014	0.009	0.003	0.001					26
0.029	0.023	0.018	0.011	0.007	0.002	0.001					27
0.026	0.020	0.016	0.010	0.006	0.002	0.001					28
0.022	0.017	0.014	0.008	0.005	0.002						29
0.020	0.015	0.012	0.007	0.004	0.001						30
0.005	0.004	0.003	0.001	0.001							40
0.001	0.001	0.001									50

The factor values for Table 3 are

$$\text{PV Factor} = (1 + r)^{-n}$$

Table 3 is the reciprocal of Table 1.

Table 4 is used to compute the present value of a *series* of *equal* annual cash flows.

EXAMPLE—TABLE 4 Arthur Howard won a contest on January 1, 2002, in which the prize was \$30,000, the money was payable in 15 annual installments of \$2,000 every December 31, beginning in 2002. Assuming a 9 percent interest rate, what is

Table 4. Present Value of \$1 Received Each Period for a Given Number of Time Periods

Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.893
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.690
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.402
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.037
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.605
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.111
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.564
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	4.968
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.328
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.650
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	5.938
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.194
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.424
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.628
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606	6.811
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	6.974
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.120
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.250
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.366
20	18.046	16.351	14.878	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.469
21	18.857	17.011	15.415	14.029	12.821	11.764	10.836	10.017	9.292	8.649	7.562
22	19.660	17.658	15.937	14.451	13.163	12.042	11.061	10.201	9.442	8.772	7.645
23	20.456	18.292	16.444	14.857	13.489	12.303	11.272	10.371	9.580	8.883	7.718
24	21.243	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.707	8.985	7.784
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	7.843
26	22.795	20.121	17.877	15.983	14.375	13.003	11.826	10.810	9.929	9.161	7.896
27	23.560	20.707	18.327	16.330	14.643	13.211	11.987	10.935	10.027	9.237	7.943
28	24.316	21.281	18.764	16.663	14.898	13.406	12.137	11.051	10.116	9.307	7.984
29	25.066	21.844	19.189	16.984	15.141	13.591	12.278	11.158	10.198	9.370	8.022
30	25.808	22.396	19.600	17.292	15.373	13.765	12.409	11.258	10.274	9.427	8.055
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.244
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.234	10.962	9.915	8.305

the present value of Mr. Howard's prize on January 1, 2002? From Table 4, the required multiplier is 8.061, and the answer is:

$$\$2,000 \times 8.061 = \$16,122$$

The factor values for Table 4 are

$$\text{PVa Factor} = \frac{1 - (1 + r)^{-n}}{r}$$

Table 4 is the columnar sum of Table 3. Table 4 applies to *ordinary annuities*, in which the first cash flow occurs one time period beyond the date for which the present value is to be computed.

14%	15%	16%	18%	20%	25%	30%	35%	40%	45%	50%	Periods
0.877	0.870	0.862	0.847	0.833	0.800	0.769	0.741	0.714	0.690	0.667	1
1.647	1.626	1.605	1.566	1.528	1.440	1.361	1.289	1.224	1.165	1.111	2
2.322	2.283	2.246	2.174	2.106	1.952	1.816	1.696	1.589	1.493	1.407	3
2.914	2.855	2.798	2.690	2.589	2.362	2.166	1.997	1.849	1.720	1.605	4
3.433	3.352	3.274	3.127	2.991	2.689	2.436	2.220	2.035	1.876	1.737	5
3.889	3.784	3.685	3.498	3.326	2.951	2.643	2.385	2.168	1.983	1.824	6
4.288	4.160	4.039	3.812	3.605	3.161	2.802	2.508	2.263	2.057	1.883	7
4.639	4.487	4.344	4.078	3.837	3.329	2.925	2.598	2.331	2.109	1.922	8
4.946	4.772	4.607	4.303	4.031	3.463	3.019	2.665	2.379	2.144	1.948	9
5.216	5.019	4.833	4.494	4.192	3.571	3.092	2.715	2.414	2.168	1.965	10
5.453	5.234	5.029	4.656	4.327	3.656	3.147	2.752	2.438	2.185	1.977	11
5.660	5.421	5.197	4.793	4.439	3.725	3.190	2.779	2.456	2.197	1.985	12
5.842	5.583	5.342	4.910	4.533	3.780	3.223	2.799	2.469	2.204	1.990	13
6.002	5.724	5.468	5.008	4.611	3.824	3.249	2.814	2.478	2.210	1.993	14
6.142	5.847	5.575	5.092	4.675	3.859	3.268	2.825	2.484	2.214	1.995	15
6.265	5.954	5.669	5.162	4.730	3.887	3.283	2.834	2.489	2.216	1.997	16
6.373	6.047	5.749	5.222	4.775	3.910	3.295	2.840	2.492	2.218	1.998	17
6.467	6.128	5.818	5.273	4.812	3.928	3.304	2.844	2.494	2.219	1.999	18
6.550	6.198	5.877	5.316	4.844	3.942	3.311	2.848	2.496	2.220	1.999	19
6.623	6.259	5.929	5.353	4.870	3.954	3.316	2.850	2.497	2.221	1.999	20
6.687	6.312	5.973	5.384	4.891	3.963	3.320	2.852	2.498	2.221	2.000	21
6.743	6.359	6.011	5.410	4.909	3.970	3.323	2.853	2.498	2.222	2.000	22
6.792	6.399	6.044	5.432	4.925	3.976	3.325	2.854	2.499	2.222	2.000	23
6.835	6.434	6.073	5.451	4.937	3.981	3.327	2.855	2.499	2.222	2.000	24
6.873	6.464	6.097	5.467	4.948	3.985	3.329	2.856	2.499	2.222	2.000	25
6.906	6.491	6.118	5.480	4.956	3.988	3.330	2.856	2.500	2.222	2.000	26
6.935	6.514	6.136	5.492	4.964	3.990	3.331	2.856	2.500	2.222	2.000	27
6.961	6.534	6.152	5.502	4.970	3.992	3.331	2.857	2.500	2.222	2.000	28
6.983	6.551	6.166	5.510	4.975	3.994	3.332	2.857	2.500	2.222	2.000	29
7.003	6.566	6.177	5.517	4.979	3.995	3.332	2.857	2.500	2.222	2.000	30
7.105	6.642	6.234	5.548	4.997	3.999	3.333	2.857	2.500	2.222	2.000	40
7.133	6.661	6.246	5.554	4.999	4.000	3.333	2.857	2.500	2.222	2.000	50

An *annuity due* is a series of equal cash flows for N time periods, but the first payment occurs immediately. The present value of the first payment equals the face value of the cash flow; Table 4 then is used to measure the present value of $N - 1$ remaining cash flows.

EXAMPLE—TABLE 4 Determine the present value on January 1, 2002, of 20 lease payments; each payment of \$10,000 is due on January 1, beginning in 2002. Assume an interest rate of 8 percent.

$$\begin{aligned}
 \text{Present Value} &= \text{Immediate Payment} + \left\{ \begin{array}{l} \text{Present Value of 19 Subsequent} \\ \text{Payments at 8\%} \end{array} \right. \\
 &= \$10,000 + (\$10,000 \times 9.604) = \$106,040
 \end{aligned}$$

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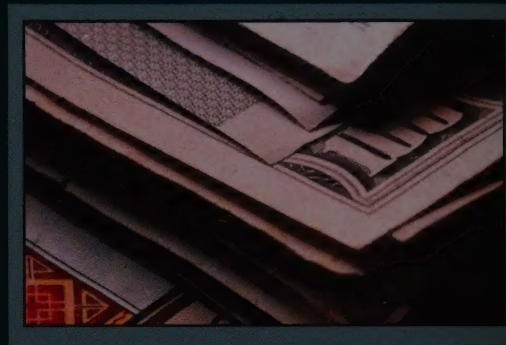
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